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SUPREME COURT HEARS GLASS DEFENDANTS' CASE AGAINST TOLEDO DECREE

On October 9th and 10th the Supreme Court of the United States heard a reargument of the propriety of the terms of the final decree which the Toledo district court handed down two years ago in the glass container anti-trust case. For two days, before a crowded court room, seven justices heard a rapid fire presentation of the glass container industry's case against the novel and sweeping provisions of what is most often called a "punitive" decree, with an equally rapid fire defense of that judgment by attorneys of the Department of Justice. Frequent questions from the bench showed the lively interest of several members of the court, notably Chief Justice Stone and Justices Reed, Roberts and Frankfurter.

In accordance with the suggestion of the Court, attorneys John T. Cahill, for Hartford-Empire Co. and Robert T. Swaine, for Owens-Illinois Glass Co., spoke for all defendants in respect to objections common to all. The following attorneys spoke for their individual clients: Boykin C. Wright for Corning Glass Works, Stephen H. Philbin for Hazel-Atlas Glass Co., Lehr Fess for Lynch Corp., E. W. McCallister for Ball Brothers Co., Fred C. Fuller for the individual defendants I. J. Collins, T. C. Fulton, W. V. Fisher and J. D. Dilworth, and Luther Day for the Glass Container Association.

Hugh B. Cox, Assistant Solicitor General, and Samuel S. Isseks, Special Assistant to the Attorney General, presented the Government's rebuttal of the objections raised by the appellants. Because the Government's case was in the nature of rebuttal it is impractical in a review of this kind to cover it in detail in the same manner as the argument of the appellants. The record of nearly 400 pages is primarily a recital of what, to the defendants, are the specific injustices of the decree. These were set forth following the pattern of the decree itself. Replying paragraph by paragraph, the Government defended the fundamental principles it followed in drafting the decree.

These principles or theories are three in number:

First, the view that all who were found to be partners in the conspiracy should be treated alike; second, the conspiracy has a continuing effect—a momentum of its own that will continue after the acts of the conspiracy have been stopped; third, it is the duty of the Court to dissipate the consequences of the conspiracy or, so to speak, neutralize its continuing effects.

Individuals Restrained to Avoid "Loopholes"

Considering these in order, it may be pointed out that the Department of Justice has left no doubt about its frankly stated view that when any defendant is shown to have done any act connected with the conspiracy he becomes a part of it and should be subjected to the same restraints as all the other partners. As Mr. Isseks said: "They say that the provisions of the judgment should apply only to those particular defendants who did what each paragraph specifically forbids. We submit, Your Honors, that this objection is based upon a fundamental misconception of the law applicable to conspiracies. We repeat what we stated in our brief: The judgment in this case assumes that all the conspirators are charged with liability for the conspiracy as a whole. The parties were engaged in a joint venture, like a partnership. Mr. Justice Holmes in *United States v. Kissel,* 218 U. S. 601, stated: 'A conspiracy is a partnership in a criminal purpose.' He was there referring to an anti-trust indictment. The relationship, Your Honors, was that of principal and agent, and we cite cases in our brief . . . where co-conspirators were held jointly reliable in equity for sums of money as a result of fraud perpetrated by one of the co-conspirators or somebody else."

Later Mr. Isseks said: "The theory in our case is that each defendant is responsible for the acts of his co-conspirators. He either knew about it or is presumed to have known about it. He is either in the case or he is out of the case. . . . Of course, there may be gradations. Take for instance the Association. We have not included the Association in any paragraph except 37 to 40, I believe, because the Association's activities were connected with the other defendants only with regard to statistics and keeping people out of the industry."

Mr. Isseks made clear that the Justice Department applies the same reasoning to the individual defendants as to their corporate employers. "Our view is that there should be no loophole whereby individuals can go out and do that which the decree directs should not be done.

* * * It is most important, we submit, that individuals should not be used as a means of circumventing the effect of the judgment."

Momentum Concept Basis of Restraints

The concept of a continuing momentum to the conspiracy, or at least a momentum of its effects, is basic in the principal restraints of the decree. It was one basis for the Hartford receivership. When Mr. Isseks said that the receiver was appointed to maintain the status quo, the Chief Justice asked him whether this was necessary from the point of view of preventing continuance of the conspiracy. The reply indicated that to continue to pay the royalties to Hartford would have aided the conspiracy.

Speaking of Hartford's change to unrestricted licenses, Mr. Isseks said: "It is just a waiver on the part of Hartford, and Hartford, as I will point out later, persists in claiming it can re-insert those restrictions. Ball's agreement today has restrictive agreements. Hazel's agreements have restricted agreements. Owens' agreement today has a restrictive agreement. Owens cannot use Hartford's machines in connection with Fibreglas. It is an agreement that is in effect today. Fibreglas is not in this case, Your Honors, I agree. But I wish to point out that the restrictions still persist. In other words, this is a continuing conspiracy. As one of the Justices pointed out last year, you can't stop this. The momentum goes right along."

This reasoning was inherent in the arguments supporting such prohibitions as those against leasing of machinery and collection of royalties; the requirements of compulsory licensing of not only present but future patents to all comers; the licensing of present patents royalty free for the life of the patents, and the prohibition against distributing machinery otherwise than by outright sale.

The Government sought to show that the foregoing and other provisions of the decree are essential to dissipate such alleged consequences of the conspiracy as the consequent dominance of different companies in their respective fields, the consequent power to exclude from the industry, the consequent cost disadvantages arising from royalty payments, and the consequent aggregations of patents such as the feeder pool.

As Mr. Cox put it, "The glassware industry now has an artificial structure bottomed on the monopolies disclosed by this court. This structure can be maintained in the future without the need of concerted action. The conspiracy has a momentum of its own. It can only be destroyed by court decree."

"The purpose of the law," Mr. Cox summed up, "is to protect the freedom of the economy, to make sure that competition is possible. We assume that this is the purpose that guides the Court in framing decrees. We have no desire to punish or penalize appellants. We submit that the courts have the power and should take effective steps to neutralize the effect of this kind of combination of patents and to open the industry to competition. We submit that the provisions of these paragraphs should be affirmed as they were written by the District Court."

This in brief, was the nature of the Government's case in favor of the Toledo decree. It is what the Appellants were "up against" in their argument, which is summarized in the following pages.

Hartford Receivership Attacked as Unnecessary

John T. Cahill, attorney for Hartford, opened the reargument and addressed himself particularly to the receivership which he said the Toledo court appointed summarily and without notice to his client, subsequently denying any stay pending the appeal. Answering the Government's contention that the receivership was necessary to protect Hartford, Mr. Cahill said his client should have the right to decide whether or not it wanted such protection, and that the doctrine of compulsory protection "smacks much of recent practices abroad." Hartford has taken substantial steps to correct all the practices complained of by the Government, Mr. Cahill declared, saying that an injunction punishable by contempt would have been just as effective as the receivership to stop any further violations.

Nor did the payments to Ball and Corning justify the extraordinary receivership, he said, adding that Hartford had stated in open court that it would endeavor to obtain surrender by licensees of any exclusive rights to its patents and thereafter to grant non-exclusive unlimited licenses to all. "Certainly Hartford didn't want to make those payments. Besides, all this occurred two years before the receivership was ordered, and two years after the fact that those agreements had been made was disclosed to the District Court."

The Government has frankly conceded that no receivership of this nature has ever been appointed before, said Mr. Cahill. Quoting Justice Brandies' remark that "Courts are ill equipped to run businesses" he said if they commence appointing receivers for all who violate the law, their business functions will soon overshadow their judicial functions.

Asks Return of Funds to Hartford

Turning to Paragraph 15 of the decree which orders the earmarking of all royalty income for the account of the various licenses, pending the outcome of appeal, Mr. Cahill charged that this has forced the receiver to invade Hartford's capital to the extent of $3,500,000 to date in order to obey the Court's instruction that they continue furnishing research and engineering services to the industry. Paragraph 15 states that if judgment is sustained against Hartford the funds are to be returned to the licensees, less any expenses "properly chargeable and allocable" to such licensees. It was denied that this clause assures Hartford of anything because the court must find that the amounts are "properly chargeable and allocable" before Hartford can receive a penny and then it is to be repaid only for what the receiver actually pays out, with nothing for inventions and development work prior to the receivership. This compulsory performance by Hartford of its contractual obligations, invoked without definite assurance of repayment, is not authorized by the anti-trust laws, said Mr. Cahill. He declared that the courts have uniformly held that the contracting party who violates the anti-trust laws does not forfeit all recovery for goods and services rendered. To quote the record:

Any other result would in this case amount to a fine greater by a thousand times than any fine that could be imposed even in a criminal proceeding under the Sherman Act. Frankly, it would bankrupt—

MR. JUSTICE ROBERTS (Interposing): Do you suggest any disposition of funds not allocable to these licensees?

MR. CAHILL: Yes, sir, Mr. Justice, it would return the funds to the firms that made the funds. Those who made the performance would get the money. It would bankrupt my clients. This is a matter of life and death to the Hartford Company. We have already had the inevitable treble damage suits which flow in the trail of anti-trust actions. One is now pending against us which by itself asks for five million dollars. Unless this earmarked income is released to Hartford in order to enable it to restore its depleted capital and to continue its research and service there is little chance of Hartford's being able to continue to serve the small container manufacturers who have not the financial resources to maintain research facilities as desired by the lower Court, the Government, and the licensees.

I respectfully submit the money earmarked under this paragraph should be given to my client. On the Government theory, all the Defendants are in *pari delicto*. There is no reason why this small company, Hartford, should give this windfall to its alleged co-conspirators at the expense of the stockholders of Hartford.

Leasing Ban Attacked as Indiscriminate

Paragraph 21 of the decree enjoins Hartford, Corning, Empire Machine Co., Owens-Illinois, Hazel-Atlas, Thatcher, Lynch, Ball, and the individual defendants associated with these companies and four individual defendants associated with Anchor-Hocking—"from leasing or otherwise distributing or surrendering possession of said (glass making) machinery by means other than an outright sale for cash or on credit not to extend over a period of more than two years." This prohibition of the admittedly legal device of leasing was attacked by Mr. Cahill as typical of the "indiscriminate application" of the judgment. "My client is the only defendant here which is leasing machinery," he said. "Owens, who used to engage in business ceased to do so as far back as 1918. The paragraph nevertheless applies to all defendants. The prohibition is not limited to leasing provisions which achieve unlawful control by a lessor; it is not limited to leasing for an unlawful purpose; instead, leasing under any conditions and for any purpose is prohibited. This provision would prevent my client from continuing as a research and engineering company. Hartford has found by experience that the only way it can finance research and development is by leasing machinery."

In one of a series of pointed questions, the Chief Justice said: "Apart from the price, what is your complaint?"

MR. CAHILL: My complaint, Mr. Chief Justice, is that first I submit that since Hartford is the only Defendant engaged in leasing, the injunction at most should run only against Hartford. Secondly, I submit that if any illegality be found in the Hartford leasing system, a sufficient remedy would be the injunction against Hartford of unlawful leasing, because since leasing is necessary for the continued existence of Hartford—they couldn't if they were dissolved, Mr. Chief Justice, but the District Court and the Government both find—

THE CHIEF JUSTICE (Interposing): It would be a less drastic penalty than dissolution.

MR. CAHILL: In substance, it turned out to be dissolution and the District Court found it wasn't in the public interest to have Hartford dissolved. The Government takes that position here, that it is not in the public interest to have Hartford dissolved; the licensees take that position here, especially the small ones, because the big ones can maintain research laboratories; the small ones cannot. Twenty of them offered to testify in the District Court that they need Hartford in their business, and the Government takes the position here that Hartford should continue. So I say, why take the position that Hartford should continue and at the same time in substance do something that will bring about the discontinuance of Hartford in the research business?

MR. JUSTICE REED: You don't question the power; you question the discretion.

MR. CAHILL: I question the discretion.

Mr. Cahill denied that the cases cited by the Government in support of the leasing prohibition involve any substantial deprivation of the right to do things lawful per se and said that "never at any time has this (Supreme) Court struck down a lawful device such as leasing in perpetuity, which is what this judgment does.

Chief Justice Stone then commented, "So the real proposition is that this is drastic and has to be balanced with other considerations." He asked if the Government had stated what would happen "if you were left free with the license which they state is unlawful?"

The reply was "I don't recall that, but the Government argued this decree paragraph by paragraph as if it didn't have all these other harsh provisions in it, and as if we were left in a position where the day after tomorrow we could all combine again and start off with the purpose of beginning, as you suggest, a new Sherman Act combination, whereas the fact is that whatever concerted action there has been in the past is emasculated by subsequent paragraphs (not on leasing) and the wholesale cancellation of all agreements between these defendants."

Taking up Paragraph 22 which requires the sale by Hartford of existing machinery in licensed plants, Mr. Cahill said this had the same vices as the leasing provision and would force Hartford out of business to the detriment of the smaller companies which depended on its research and engineering facilities. Added to this, he said, is the unfairness of confiscatory pricing of the machines stemming from the requirement that rentals previously paid must be taken into consideration in determining "reasonable prices."

Sees Judicial Legislation Attempted

Of all the provisions of the decree Paragraph 24 is perhaps of greatest general interest. It will be recalled that this enjoins all eight defendants previously mentioned from engaging in the machinery business unless they

(a) agree to license any applicant under all present patents or applications pending, royalty-free and for the life of the patents;

(b) agree to similarly license any applicant under patents granted or applications filed *subsequent* to the judgment at a "reasonable royalty" with all disputes as to reasonableness to be determined by the court;

(c) agree to make available to any licensees a copy of any and all drawings and patterns relating to the licensed inventions with the single exception of Lynch type forming machines for narrow neck ware. Of this punitive remedy, Mr. Cahill said that Government counsel had conceded that Paragraph 24 in effect cancels the patents of the defendants. Thereby, he said, millions of dollars worth of patent property, representing 30 years of research, are wiped out. Hartford, he said, would have to wind up its affairs as a result, because 80 per cent of its income is derived from leasing.

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WAR CONDITIONS RESULT IN IMPROVED QUALITY AND MASS PRODUCTION IN SWEDISH GLASS

The Swedish glass industry producing to a great extent, until the present war, by off-hand methods, has felt the effects of war to a degree almost as great as the belligerent countries although in quite a different way.

While the glass producing nations at war have necessarily had to gear their operations to the direct demands of war, Sweden has developed her glass producing facilities to meet her own specific needs.

Two factors are responsible for the change in Sweden's glass manufacturing activities. One, a direct result of the war, the stringent reduction in the export market for glass; the other, a strictly home development, propaganda conducted by the Swedish Handicraft Association to make Swedish consumers of merchandise in the lower price brackets, beauty conscious. The slogan "More Attractive Goods for Everyday Use" coupled with carefully prepared publicity and public exhibitions is said to have had a revolutionary effect on the sale of lower priced glassware.

It is not to be assumed that Sweden has forsaken entirely the production of artistic and expensive glassware, such as the famed Orrefors. However, art for art's sake is today secondary as far as the collective thinking of the industry goes. And although Swedish glass manufacturers still enjoy a certain proportion of cargo space on "safe conduct" ships to South America and look forward to recapturing their export markets, it is the home trade which is all important today.

Off-hand production is still an essential part of Sweden's glass production in her twenty odd glass plants, but the war, together with the promotional efforts of the Handicraft Association and the Swedish Co-operative Union which has among its members from varied industries some glass plants, has led to greatly increased use of mechanized methods. Many of the glassblowers who were formerly devoted only to the use of the punty now man modern forming machines turning out bottles, jars, tumblers, miscellaneous tableware and many other utility items.

Most important among the producers of this type of ware are the Eda Glass Works, Kosta Glass Works and the well known Orrefors, examples of whose medium and low priced tableware are illustrated.

Sweden's comparatively small domestic requirements may not permit the present rate of operation after the war. In the meantime, however, Swedish glass makers are meeting the country's requirements in essential containers and improved utilitarian items.

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"The other defendants," he said, "will be injured in direct proportion to the time and effort they have devoted to research and invention. The greater a defendant's contribution to the progress of science and the useful arts, the greater his punishment. This harsh and drastic penalty for anti-trust violation has repeatedly been suggested to Congress; for example, by the TNEC. Congress, however, has uniformly refrained from enacting it into law. Paragraph 24 is a clear attempt to write into the anti-trust laws, by judicial legislation, a drastic penalty rejected by Congress."

Mr. Cahill denied that this means that the defendants' patents are untouchable by the Courts under the anti-trust law, but he said that applying the St. Louis Terminal case, the Government was demanding both that the "Terminal" be broken up and kept open at the same time, but without reasonable compensation. Fifteen different arguments, he said, were advanced by the Government "to support this radical extension of the anti-trust laws." The effect of these arguments, although expressly disclaimed in the Government's brief, Mr. Cahill said, "is that violation of the anti-trust laws by a combination of patents constitutes a misuse of the patents which necessitates their permanent forfeiture." He declared that there is no case where the Supreme Court has held that anti-trust violation has required such forfeiture.

The principle involved goes far beyond the instant case, he said, and is a matter of deepest concern to the business of the country. If a misstep in the combined use of patents destroys them forever no research organization would dare enter into cross licenses. This would straightjacket industrial progress, Mr. Cahill declared.

The Government, he said, seeks to avoid the consequences of such a holding by saying that the patents be forfeited until the consequences of the illegal combination have been dissipated, and "by a coincidence they find that the consequences will not be dissipated for the full life of all existing patents. That is merely another way of stating their first point, that the consequence of a patent owner violating the anti-trust law is a forfeiture of the patent forever."

Turning to the Toledo Court's "enactment of compulsory licensing of patents yet unborn," Hartford's attorney said this was another of the TNEC recommendations by the Department of Justice, rejected by Congress and expressly disapproved by the President's National Planning Commission. This requirement, he argued, is a flat nullification of the constitutional directive that inventors are entitled to the exclusive right to their inventions. "An American patent, we believe, is the right to exclude, not a right to collect royalties. These future patents can never have been misused, because they have never existed. They have no consequence to dissipate because they haven't yet been born."

Regarding Paragraph 24's requirement that drawings and patterns be given, Mr. Cahill said that this would destroy the "know-how" of making machines "because by disclosure it is destroyed." The result would be that "professional men who have dedicated their lives to research and are the individual defendants in this case, are mortgaged for the rest of their lives . . . to the terms which this Court thinks are reasonable for them to have for their inventions."

Robert T. Swaine Hits Injunction of Lawful Acts

Robert T. Swaine, attorney for the Owens-Illinois Glass Co., continued the discussion begun by Mr. Cahill, of paragraphs of the decree which affect all the defendants. He first attacked Paragraph 29, which enjoins them from ever entering into any agreement which places "a single limitation on the scope of a single patent license by a single defendant with respect to a single patent." This, said Mr. Swaine, is another instance where a TNEC legislative proposal, rejected by Congress, had been inserted "without even substantial verbal change."

The Government's argument, he said, was that the appellants, as parties to Hartford's restrictive licensing system, "should be enjoined from ever again using licenses for the purpose of imposing restrictions upon the industry or any member thereof which have the effect of restraining freedom of competition required under the Sherman Act."

That is the defense, he said, but it is not what Paragraph 29 does. Actually, said Mr. Swaine, the Hartford licensing system is destroyed by Paragraphs 27 and 28, which cancel every existing Hartford lease or license. Paragraph 29, he indicated, has the plain effect of enjoining all the defendants indiscriminately from ever making any agreements exploiting any patents, regardless of whether they are in the glass field, or in any way related to any act of the conspiracy. Mr. Swaine declared he was "not trying to argue that acts lawful per se may not be enjoined as part of an illegal plan, or a method of accomplishing an illegal purpose not specifically shown . . . could not be enjoined. What we insist is that conduct lawful in itself may not be perpetually enjoined in gross, apart from a connection or a probable connection between that conduct and some illegal purpose."

After a year's reflection, said Mr. Swaine, the Department of Justice "now suggests that the paragraph be limited to glassware, glass machinery, methods and processes, but the feeders to which it would thus apply would still include a vast subject matter not suggested either by the complaint or the record." To whatever field the paragraph be limited, he said, it still denies the right of the defendants independently to engage in lawful, commercial practices, and it restrains the individual defendants irrespective of their leaving the employ of the corporate defendants. He quoted the Supreme Court's opinion in the Bausch & Lomb case, where the Department had proposed that the defendant be required to sell to anyone offering to pay cash:

"Congress has been liberal in enacting remedies to enforce the anti-monopoly statutes, but in no instance has it indicated an intention to interfere with ordinary commercial practices."

Says Stock Ban Goes Far Beyond Purpose

Shifting to a new subject, Mr. Swaine next took up the decree's injunctions against the ownership of securities or holding office in more than one company. These

were defended by the Department as necessary "to insure the maintenance of competition." Mr. Swaine argued that these provisions "needlessly go far beyond that declared purpose"—to the point where none of the 57 individual defendants may buy a share of General Electric or Westinghouse, which make light bulbs. He said that if these prohibitions are to be retained at all, the least that can be done to bring them within the proper scope of an anti-trust decree is to make them prohibit the holding of securities in significant amounts in corporations whose business is competitive with that of the particular defendant.

As to acquisition of the assets of concerns in the glassware or machinery fields, Mr. Swaine said, "Again, it applies irrespective of absence of competition between vendor and vendee and as to individual defendants, irrespective of their leaving the corporate defendants." The findings, he said, probably do sustain a decree dissolving the ownership by some of the defendants of common holdings in both Corning and Hartford, but as to none of the other defendants are the paragraphs at all supported by the record. Regarding physical assets, the record affords no basis for an injunction against even the acquisition of competing assets, he declared, adding that if the Department questions any future acquisition, it should be the subject of a separate anti-trust suit, not a contempt proceeding under the decree.

'Ban on Acquisitions Would Freeze Owens Techniques'

Paragraph 51 enjoins any defendant from acquiring, otherwise than by direct issuance from the Patent Office, any patents or exclusive rights to an invention which produces results "identical with, similar or alternative" to those obtained by inventions controlled by the defendant. Inventions by employees during the period of their employment are excluded, as are non-exclusive rights, provided there is no agreement precluding the owner of the patent from non-exclusive licensing of any others. Paragraph 52 enjoins obtaining any patent for the purpose of "blocking off" or "fencing in" or with the intent not to use commercially within four years from the date of issuance.

Regarding these injunctions, Mr. Swaine said: "The Department objects to the expansion of gob feeder patents or the creation of a similar pool in any field by any defendant. Here, again, the language has an impact far beyond the alleged evil. Once a defendant patents a single invention . . . he may not acquire another invention if it accomplishes a similar or alternative result. Few inventions are so basic as to be unrelated to any antecedent invention. Most inventions are improved or alternative methods of doing something, the germ of which lay in an earlier invention. . . .

"The application of 51 to all the defendants is defended on the ground of participation by the corporate defendants in Owens' alleged patent field which applied only to gob feeders and formers, and Owens must be forever frozen in its manufacturing techniques, asserts the Department, because its gob patents were in Hartford's alleged pool, notwithstanding that not since '35 has Owens had the slightest interest in the pool and has made its patents available non-exclusively to the industry."

The proviso purporting to permit defendants to patent their own inventions is nullified, Mr. Swaine said, by the restrictions in the succeeding Paragraph 52 against acquiring patents with intent to "block off" or "fence in" or without intention to put them to early commercial use. The first of these mental states, he said, is elemental in an American patent; every patent blocks off others from invading its boundaries, and the Patent Act provides that if an inventor discloses his invention to the public, he may exclude the world from its use for 17 years, whether or not he uses it himself. Furthermore, as to many inventions, there can be no intent to use or not to use, because their value remains to be determined by subsequent developments.

Suggests Leaving Legislation to Congress

"The issue here," he said, "is not whether the patent laws should be amended to require either licensing or use as a condition precedent to continued vitality of a patent. That is a question of policy of Congress, on which the Department for years has vigorously taken one view, while the President's patent planning commission has taken the other view, and Congress itself, for more than a century has adhered to the other view."

Going on to Paragraphs 53 and 54, Mr. Swaine said they "rewrite the rules of the Patent Office against these defendants." The reason given by the Government is early cooperation between Hartford and Owens, which is conceded to have ended in 1932. "Some of the provisions of these paragraphs might well make good Patent Office rules, but Patent Office rules are for the Patent Office, not this Court," he declared. "Furthermore, these paragraphs again contain that all-embracing language characteristic of the decree enjoining procedure which is not only normal but beneficial, and has been encouraged both by the Patent Office and this Court.

"A single example: A single interference between a defendant and any outside inventor may never be settled by negotiation, even though the settlement be disclosed to the Patent Office."

Mr. Swaine concluded his argument with a discussion of the general theory of the decree and the arguments advanced by the Government in its support, both of which were covered in the opening pages of this review. He added this piece of information, however: The briefs of the Department of Justice show that 27 of the 55 disputed paragraphs of the decree require modification, "just to make them say what the Department now says it meant to say!"

Corning Protests Licensing of Ribbon Machine

The all-inclusive nature of the decree accounted for the appearance of attorneys for a number of individual defendants. Opening this phase of the case, Boykin C. Wright told the Court that regardless of the propriety of the compulsory licensing and royalty provisions of the decree there was no justification for their application to Corning. He declared this of great importance to Corning because its ribbon machine would be subject to Paragraph 24 (a). Corning's machines, he said, had never been used by Hartford, though the latter's machines had been used by Corning under the 1922 agree-

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GLASS IS THE SUBJECT OF VARIOUS PAPERS AT THE FALL MEETING OF THE OPTICAL SOCIETY

At the Fall Meeting of the Optical Society of America which was held at the Hotel Pennsylvania in New York on October 20 and 21 several papers dealt with glass. The program, of contributed papers, ably divided into three half day sessions on vision and color, spectroscopy and general optics, was preceded by an all day symposium of invited papers reviewing applications of optics.

In a most intriguing paper of broad general interest in this symposium, glass appears in the form of a pyrex tube five feet long and six inches in diameter serving as a successful container of an underwater camera. M. Ewing, in his discourse on "Photography of the Ocean Bottom," pointed out that the problem of underwater photography is not truly optical in nature, but involves inducing an underwater model to pose and getting the camera back. The camera was constructed to take two pictures, one immediately when the camera touched the bottom with its trigger device and another half a minute later. The ballast consisted of a piece of iron and a piece of rock salt. When the salt had dissolved slowly through a bag, the camera came back with pictures that could adorn the Ceramists' Camera Club even if they were not labeled "underwater." A pair of sharks proved to be extremely photogenic.

Two other papers not dealing with glass were quite fascinating. H. R. Condit's "Color Motion Pictures of the Whole Sky" amazed the many optical men from Rochester by the amount of sky appearing between the clouds on the days apparently hand-picked for this purpose. The reflection of the entire sky in a spherical mirror had been photographed continuously and when shown by fast motion represented an interesting record of flows of clouds floating in contrasting winds. R. D. Heidenreich "Techniques in Applied Electron Microscopy" showed, for the first time, three dimensional electron micrographs revealing metal structures in space.

On the borderline of the field of glass was F. Benford's discussion on the projection of light.

The fluorescence of glass was the subject of a paper and some demonstrations by N. J. Kreidl "Recent Studies on the Fluorescence of Glass." The phenomenon of fluorescence served as an indicator or "signal" of changes in the constitution of new optical and filter glasses. A more practical application of fluorescence, the identification of various types of optical glasses in the optical shop by means of a short wave sterilizing lamp, was also demonstrated.

"Practical Applications of Metallic and Non-Metallic Films on Optical Elements" were summarized by D. A. Lyon. In comparing the optical efficiency of aluminum, silver and rhodium films the speaker emphasized the superiority of silver. The usefulness of rhodium is based on its performance under chemical attack.

An interesting combination is the use of such a mirror on top of a high reflecting surface. To a review of the well known monolayer films like MgF_2, was added a discussion of double layer films. The author predicted that much interesting information will become generally available after the termination of the national emergency.

During the session on vision and color, H. J. Keegan and K. S. Gibson "The Use of Working Standards of Measurements" specified wave lengths of absorption bands of Corning and Jena didymium and white vitrolite glass. This information is applicable to their use as working standards in spectrophotometry.

H. P. Gage discovered a linear equation which within certain limits permits to calculate the thickness of a colored glass required to produce a desired color change, as long as this color change is obtainable by mere variations in thickness. "Thickness Control of Color of Sharp Cut Off Type of Glasses."

S. Hecht and Yun Hsia discussed the use of red glass goggles for faster dark adaptation in equally bright illumination. "Dark Adaptation Following Light Adaptation to Red and White Light."

In the general optics session an inspection procedure based on a numbered set of scratch and dig samples for use in the optical shop was reported by J. H. McLeod and W. T. Sherwood.

At the informal annual dinner the A. Lomb medal was presented to Dr. R. Clark Jones of the Bell Telephone Laboratories.

Following are the abstracts of eight papers relating to glass technology, together with the titles of other papers presented which were not in this category:

The Projection of Light. *By F. Benford, General Electric Company.*

In the course of a discussion of computing the distribution of light in a searchlight beam by graphical summation of zonal images, various shapes of glass lenses are discussed to bring out their limitations. Fresnel lenses, having interrupted parallel surface parts on a saw-like surface, ellipsoid and hyperboloid lenses were included. The suppression of the searchlight image by a combination of ellipsoid and hyperbolic curve was shown.

Practical Applications of Metallic and Non-Metallic Films on Optical Elements. *By D. A. Lyon, Consultant.*

Silver has the highest reflectivity of the three metals used in reflectors for optical usage. Aluminum is used as a front surface reflector because of its relative resistance to tarnishing. In spite of its lesser reflectivity, rhodium is applied because of its high resistance to abrasive and chemical corrosion.

In the field of non-metallic films MgF_2 films at this time represent the most common reflection reducing agent on glass surfaces. In semi-reflectors and beam splitters, high reflection films are used. ZnS is the example of a compound used in this way. The efficiency of a single low refractive index layer in non-reflexion films is limited because the lowest indices of fairly hard materials are still higher than the square root of the glass index, a value necessary for the complete elimination of reflection. Combinations of two layers, one of high and one of low index, can be deviced to yield a zero reflection surface, but the conditions of control are difficult.

In peacetime low reflection films will be applied to spectacle lenses, watch glasses, clock faces, instrument cover glasses and windows.

Techniques in Applied Electron Microscopy. *By R. D. Heidenreich, Dow Chemical.*

After a review of the general features of the electron microscope, some details of eminent interest were discussed. This discussion included: resolution, intensity, polystrene-silica replicas, comparison of electron and photomicrographs, polishing and grinding of metals and metallography.

Polaroid Vectograph slides were shown which permitted a qualitative estimate of contours by stereoscopic principles. The quantitative determination of diffraction grating contours was given as an example of the applications of stereoscopic methods to electron microscopy.

Recent Studies of the Fluorescence of Glass. *By N. J. Kreidl, Bausch and Lomb Optical Company.*

The structure of glass can be interpreted by changes in the color and intensity of its fluorescence. In shop practice the fluorescence of various types of optical glasses was used for their identification.

For the observation of changes of color with glass structure, the divalent manganese ion is particularly suitable. The wave length of fluorescence was increased by a high percentage of the more strongly bonded "glass forming" ions like silicon. As more weakly bonded "modifier" ions like sodium loosen the basic network structure of the glass, the fluorescence shifted towards longer wavelengths. The amount of perturbance caused by various modifiers was estimated by the magnitude of this shift and found, for instance, larger for lithium than potassium.

The fluidity of the distinction between "glass forming" and "modifying" ions was illustrated by the color shifts caused by systematical replacements of various ions. Ions of lower charge, normally considered as modifiers, such as Zn^{2+}, Pb^{2+}, K^{+}, occasionally assume some glass forming function.

The variation in structure thus was believed dependent not on the charge and apparent radius of the substituted ion, but on the charge distribution taking in account the other constituents as well as polarization and polarizability.

The most practical application of fluorescence phenomena was shown to be the identification of various types of optical glasses by their characteristic fluorescence in short wave UV light. A sterilizing lamp with a Wood's glass filter was demonstrated and its use suggested for shop practice. The color variations were explained by the varying lead and antimony content of the glasses and the influence of the base glass composition of crown, borosilicate and barium crown glasses on the fluorescence of lead and antimony.

On the Use of Working Standards of Didymium and Vitrolite Glasses for Spectrophotometric Measurements. *By H. J. Keegan and K. S. Gibson, National Bureau of Standards.*

Glasses containing the ions of the rare earth elements are characterized by absorption spectra of unusual sharpness. The bands of absorption resemble by their defined locations the narrower lines observed in crystalline materials and are very little affected by the incidental changes in glass composition because the electrons involved are shielded by an outer sphere of electrons. The defined and unalterable character of these bands makes didymium (neodymium and praseodymium) glasses applicable for the accurate measurement of transmittance of recording spectrophotometers.

The authors calibrated working standards for two didymium glasses for the slit widths noted. The measurements were made with a Gibson photoelectric spectrophotometer (Sci. Pap. Bur. Stand. *15* 325 (1919-1920)), and checked by two GE recording instruments.

Slit mμ		wave length (± 1.0 mμ for 10 mμ slit)				
10	Jena BG 11	440.6,	475.1,	526.7,	583.0,	683.5, 744.5
	Corning 512	441.0,	475.5,	528.7,	585.0,	684.8, 743.5
20	Jena BG 11	745	807	882	1072	
	Corning 512	745	808	883	1067	

For a working standard of spectral apparent reflectance vitrolite glass was calibrated by comparison with MgO.

Thickness Control of Sharp Cut-Off Type of Glasses. *By H. P. Gage, Corning Glass Works.*

It was discovered that the change in thickness of a glass to produce any desired displacement of wavelength merely due to thickness changes could be calculated from a relatively simple linear relation. For the case of sharp cut-off type glasses the values of Y, x, y, z (transmission and coordinates of 1.C.1.) may be calculated also in a simple manner under the assumption that there is complete absorption for wavelengths shorter than a critical λ. Thus any desired change of the y coordinate can be produced by a calculated thickness of the glass.

This simple relation holds true within certain limits because of the empirical fact that sharp cut off type curves have essentially the same S shape, merely displaced on the λ axis. This condition was expressed by a straight line relation between log log transmission and λ and for any range where this relation is true, the described method of thickness calculation is applicable.

Dark Adaptation Following Light Adaptation to Red and White Lights. *By S. Hecht and Yun Hsia, Columbia University.*

It appears that if equally bright for our cone system, red light will be less effective than white light in stimulating our rods. Since rods control vision in the dark, this fact has been used to accelerate dark adaption by wearing red goggles or using red illumination before entering a dark room. This theory and practice has been questioned recently but was proved valid by two new series of experiments. In the first series to reach one half log unit above the final threshold of rod vision only 1.9 minutes were required after exposure to red light as compared to 6.2 minutes in the case of white light of equal brightness for cone vision. In another series the relation between time of adaptation and intensity of the brightness to which one subject was exposed before adaptation was compared for the cases of white and red light. Again, higher intensities for equal adaptation times in the case of red light, substantiate the theory and apparently justify the practice of red light pre-adaptation.

A Proposed Method of Specifying Appearance Defects of Optical Parts. *By J. H. McLeod and W. T. Sherwood, Eastman Kodak Company.*

In order to specify to what extent scratches or digs are permitted in a given case blueprints carry two numbers referring to a numbered system of scratch and dig samples.

Other papers not relating to glass technology were:

Vision and Color

Relation of Protanoptic to Normal Vision. *By D. B. Judd.*

Spectral Sensitivity of the Dark Adapted Human Eye. *By G. Wald.*

A Mathematical Analysis of Glare. *By D. Eberle Spencer.*

Modified Chromatic Value of Color Space. *By J. L. Saunderson and B. I. Milner.*

On the Measurement of the Spectral Apparent Reflectance of Low Reflecting Materials. *By H. J. Keegan.*

Spectroscopy

The Extension of Spectrophotometric Technique by Means of Special Type Cuoettes. *By D. L. Drabkin.*

UV Absorption Methods of Analysis for Polyunsaturated Constituents of Fats, Oils and Soaps. *By B. A. Brice.*

Spectrochemical Analysis of Beryllium Ores and Commercial Products. *By L. W. Strock.*

(*Continued on page* 518)

Glasshouse Friggers

By T. TAYLOR SEAGO

Cauldron and Tripod

This frigger may be most familiar to our Scots readers. The example shown was made by a Scotsman in his native country. It was made by the late James Henderson, who worked for many years in Yorkshire before his death.

It is a very decorative piece of work and is not so universally found as some types of frigger which we have previously described.

In making, rods were drawn out, twisted and tapered one at a time, being formed from a gathering of opal, cased over with white flint glass. After annealing, the broad end was splayed and polished on a wheel and the narrow end smoothed off to a conical point.

The cauldron or "pot" was first blown as an opal ball, then shaped and constricted to form the rim. This was then cut off, the article being "stuck up" upon a pontil. The two handles and the three feet were then applied and after being detached from the pontil, the article was sent to the lehr or kiln.

These friggers, the writer learns, were made in various colors and finishes, great variety being shown in the finish of the three rods forming the tripod.

Usually, the tripod would be assembled by tying around the three rods a decorative ribbon, whilst the cauldron would be suspended by means of thin colored twine or wool.

This frigger is a decidedly good show piece, and creates many a romantic scene in the imagination of the observer. Its "eggshell" finish has inspired the following lines:—

THE GLASS CAULDRON

No witch's cauldron here we see,
But a cauldron of faery fantasy;
A tripod of shining glass is shown
Supporting a "pot" so lightly blown
As to call to mind the magic shell
Of which Hans Anderson did tell
In fairy tales of long ago—
The eggshell frail in which must water boil,
The wicked fairies' changeling child to foil—
For once the water in the shell be hot,
The mother's child shall sleep in his own cot—
And the monster who had mortal parents found,
Return to his dark realm deep underground.

REPORT FOR SECOND QUARTER SHOWS LARGE INCREASE IN ELECTRIC LAMP PRODUCTION

The War Production Board recently reported that production of electric lamps and bulbs for illumination purposes in the second quarter of 1944 totaled $38,572,000, an increase of 3.8 per cent over the $37,268,000 volume in the preceding quarter and 21.1 per cent over the $31,846,000 total for the second quarter of 1943.

Production of each type of incandescent and glow discharge lamp and bulb increased in the second quarter as compared with the first quarter of 1944. For large incandescent lamps (the usual household and commercial types), the increase in the second quarter was 3.3 per cent, from $24,144,000 to $24,936,000. Production of miniature incandescent lamps (including those used for telephone switchboards, automobile headlights, and flashlights), increased four per cent, from $5,313,000 in the first quarter to $5,525,000 in the second quarter.

Sealed beam lamps (specially designed units, containing bulb, reflector and lens, for use on vehicles for highway illumination) increased 25 per cent in volume, from $1,170,000 to $1,463,000. Production of glow discharge lamps (mercury vapor and similar lamps) increased 16.2 per cent, from $592,000 in the first quarter to $688,000 in the second quarter of 1944.

Fluorescent lamp production in the second quarter of 1944 amounted to $5,410,000, a decline of 1.6 per cent, as compared with the preceding quarter, when production totaled $5,498,000. This was the first decline in production of this type of lamp since the beginning of 1943. Shipments of fluorescent lamps also declined, from $6,720,000 in the first quarter to $3,808,000 in the second quarter of 1944.

Manufacture of photoflash bulbs, which totaled $550,000 in the second quarter of 1944, has remained at approximately the same level since the second quarter of 1943. Shipments of photoflash bulbs totaled $567,000 in the second quarter of 1944. Of this volume, 87 per cent was shipped to commercial outlets, to wholesalers, distributors, retailers, and other outlets normally selling to industrial plants, commercial concerns and households.

Shipments of large incandescent lamps totaled $21,309,000 in the second quarter of 1944. Of the total, 80 per cent went to commercial outlets, while 20 per cent was shipped for military, export, and similar purposes.

Second-quarter shipments of miniature incandescent lamps totaled $4,986,000, of which 53 per cent went to commercial outlets.

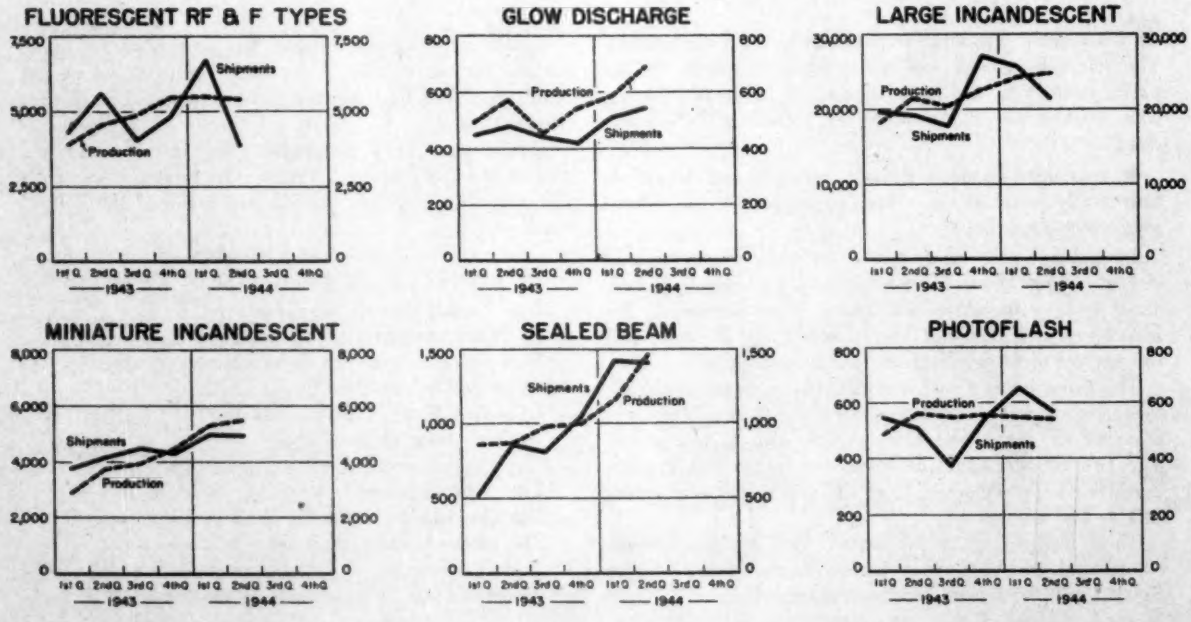
Sealed beam lamp shipments in the second quarter totaled $1,423,000, of which 75 per cent reached commercial channels.

Second-quarter shipments of glow discharge lamps totaled $544,000, of which 76 per cent went to commercial outlets.

ELECTRIC LAMPS AND BULBS

QUARTERLY PRODUCTION AND SHIPMENTS, 1943-1944

THOUSANDS OF DOLLARS



INVENTIONS AND INVENTORS

A Summary of United States Patents of Interest to the Glass Industry Issued During September

Compositions

Henry H. Blau of Bexley, Ohio, received patent 2,357,994 for a so-called minus green filter glass for photographic purposes. In filters of this type it is important that the glass have the highest possible transmission properties for blue light coupled with the least possible transmission of green. Of the various coloring oxides manganese most nearly produces the desired spectral characteristics, but in the range required, which is only about 0.1% MnO_2, control of the color effect in the glass is extremely difficult. This is due to the difficulty in controlling the conditions of oxidation during melting. Blau reports also that it had not heretofore been possible to decrease the green transmission without at the same time decreasing the blue transmission in an equal or greater proportion. According to the invention these difficulties are largely overcome by adding chromium to the glass in an amount not exceeding 0.004% Cr_2O_3 and maintaining the ratio of this oxide to MnO_2 less than 5 to 100. A glass which is lightstable and does not change in color with use, and which particularly represents the invention, has the following composition:

Silica (SiO_2)	49%
Potash (K_2O)	15
Lead Oxide (PbO)	36
Manganese Oxide (MnO_2)	0.08
Chromic Oxide (Cr_2O_3)	0.002

This patent was assigned by Blau to his former employer, the Corning Glass Works, and was applied for in 1941.

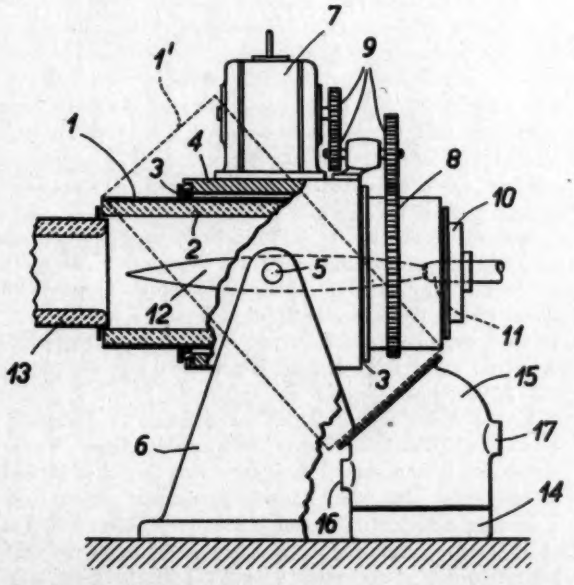


Fig. 1. 2,358,903 : Zotos. High speed rotary furnace for melting quartz and other highly refractory materials.

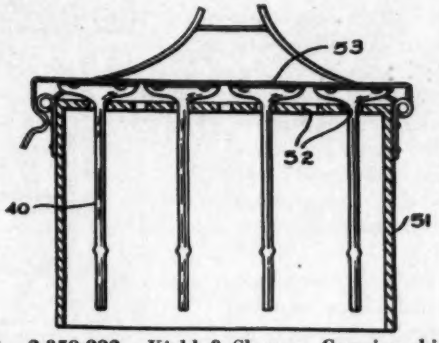


Fig. 3. 2,359,222 : Kiehl & Shaver. Carrying shield for percolator parts being moved from a hot bath of molten salts to a cooler bath to apply the quench which tempers them.

Furnaces

Fig. 1 shows the batch type rotary furnace for melting quartz as described in patent 2,358,903 issued to Georg Zotos of Berlin. The patent is held by the Alien Property Custodian. The melting of glass in rotary furnaces was actually carried out commercially by Zotos before the war, and the development was described in THE GLASS INDUSTRY, September, 1941. The furnace illustrated here is operated at so high a speed that the charge is kept spread out over the entire inner surface. This allows the maximum heating effect by radiation from the high temperature flame which may use oxygen to supplement liquid fuel.

Feeding, Forming and Shaping

H. H. Blau and Raymond W. Kell received patent 2,357,993 (Corning Glass Works) for apparatus to be used in forming glassware, such as I. E. S. reflectors, in which the mold units contain heat reflecting surfaces which are effective before ware removal to give a better stress distribution and to reduce the breakage prior to annealing. This is a division of an earlier application on similar subject matter which issued as patent 2,314,812 and was discussed in THE GLASS INDUSTRY, June, 1943.

Patents assigned to Owens-Illinois Glass Company included 2,359,216 granted to Victor E. Hofmann and John M. Blank of Toledo, and 2,359,188 to Russell G. Allen of Alton, Ill. The first covers a machine for molding or blowing hollow ware from organic thermoplastic materials. The Allen patent concerns a mechanism for operating the valves in the suction lines which cause blank molds to pick up a charge of glass from a forehearth in a forming machine of the suction gathering type. In such machines it is often desirable to prevent temporarily the application of suction to one or more molds while the machine is running, without interfering with the normal operation of other units of the machine. Allen's invention gives individual control and shut-off to each of the mold units.

Fig. 2 illustrates the continuous bottle forming machine described in patent 2,357,702, assigned by Henry F. Teichmann of Washington, Pa., to the Forter-Teichmann Co. The molds consist of a two piece body portion carried by the upper continuous chain conveyor, and a base portion carried by a similar but lower conveyor. The operation of the machine can be explained with reference to the illustration. The upper conveyor, moving counterclockwise, successively brings the body molds into position where they receive a sheared gob of glass. Each plate on which these molds rest carries a vertically reciprocal plunger 11, and there are facilities for applying both suction and pressure through them. As the molds swing around the curved end of the conveyor, the plunger extends into the mold and suction is applied to cause the neck of the blank to become shaped. Immediately, the plunger is withdrawn and compressed air fills the cavity left vacant by the plunger. The blowing of the glass then begins. Operation is so timed that before the swelling glass reaches the open end of the body mold the latter comes into engagement with the base portion carried by the other conveyor. Blowing is then completed and the ware is discharged by opening the body mold.

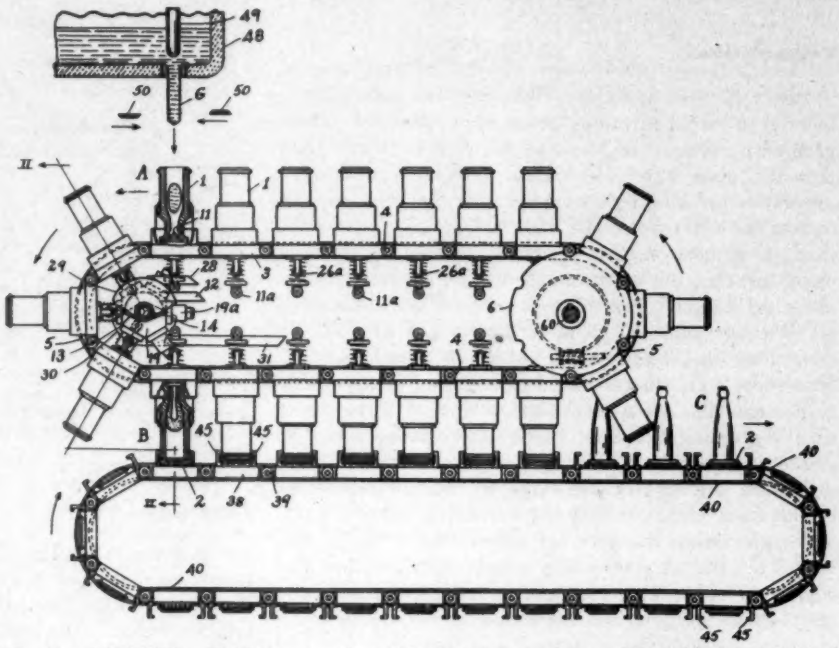


Fig. 2. 2,357,702 : Teichmann. Container-forming machine with molds consisting of split body portions carried by the upper conveyor, and base portions on another conveyor.

John W. Carnahan of Wheeling, W. Va., received patent 2,357,501 (Hazel-Atlas Glass Co.) for an automatic glass container machine of the press and blow, telescoping mold type, in which two glass charges are simultaneously charged to two molds which thereafter receive identical treatment. In the new machine the two articles may differ widely in shape and weight.

Miscellaneous Processes

Frederick W. Adams received patents 2,359,071 and 2,359,072 for methods of so etching glass as to produce a non-uniform or stippled pattern. In the first of these Pittsburgh Plate Glass Co. processes the glass is coated with a suspension of etch-resistant resin particles, such as cellulose acetate suspended in turpentine or carbon tetrachloride; the latter is evaporated so as to leave discrete resin particles distributed over the glass and providing dispersed points of protection when the etching solution is applied. The second patent describes what could be described as the reverse of this process since it relies on a film of etch-resistant resin to give protection while an etch is obtained at points where solid particles were suspended in the film. This utilizes an organic film forming material such as vinyl acetate, and suspended particles such as magnesium oxide. A slight buffing exposes the particles so that when a strong acid such as sulphuric is applied, the suspended particles are removed so that the subsequent application of the etching solution allows the glass to be attacked at those points where the particles were formerly present.

A photo-engraving process for the etching of glass surfaces is described in patent 2,357,913 granted to John V. Sigford of Wabash, Ind., and Waldo H. Kliever of Minneapolis (Minneapolis-Honeywell Regulator Co.). This is a process for applying an image by first building up layers of silver by orthodox methods until the surface has a slightly white appearance, then applying a number of layers of light sensitive bichromated colloid film to a thickness substantially equal to one half the wave length of red light, projecting the desired image upon this coating, and then developing it by the proper washes to remove that portion of the light sensitive coating conforming to the configuration of the image projected upon it.

Instead of decorating ceramic ware by dipping it or spraying it with glazing materials, Waylande C. Gregory of Bound Brook, N. J., places a supply of powdered glass within the articles (if dish-shaped), and heats it to melt the glass and to cause it to provide a coating. A crazed or crackled coating is preferred. This is patent 2,357,399.

Fig. 3 from patent 2,359,222 granted to Harry R. Kiehl and Wm. W. Shaver of Corning Glass Works shows one of the several designs of carrying shields used in conveying glass ware such as percolator pumps from a heating solution of molten salts to a similar solution at lower temperature for the purpose of tempering the ware to make it resistant to physical shock. Shields of these types prevent an undue and uncontrolled chilling of the ware while being moved.

In an apparatus for spraying paint onto lamp bulbs, covered by patent 2,358,651, M. E. McGowan of Bloomfield, N. J. (Westinghouse Electrical & Mfg. Co.), provides a continuous conveyor which causes the bulbs to rotate, and a spraying device which revolves and oscillates to follow the bulbs and direct a coating onto them from varying angles to provide a uniform coating.

Patent 2,357,727 was issued to Palmer H. Craig of Cleveland Heights, O. (Invex Corp.), for a development in electronic tubes which allows them to be air cooled. First a metallic layer is applied as by a silvering solution; then a metal unit is applied by soldering to give a cooling element comprising a heat-conducting portion attached to the tube and an integrally joined portion formed to facilitate the flow of air along the tube.

In manufacturing glass containers in the usual split molds the molding operation results in seams or ridges at the meeting edges of the mold sections. If these are too pronounced they may interfere with the sealing operation so that an imperfect seal may result. This requires close inspection, and Wm. J. Fedorchak of Granite City, Ill. (Owens-Illinois Glass Co.), has patented in 2,355,719 a device for detecting these irregularities. As shown in Fig. 4 the container J, is placed on a rotating pad 16, so that its neck is in contact with a pair of contact rolls 22, one positioned on either side of the container. These rolls are mounted in slides and as they move with the irregularities in the bottle neck each may operate a micro-switch 36 which in turn will light one of the lamps 75 or 43 to signal the operator when an excessive irregularity has been encountered. The switches are of the reset type so that when closed by movement of the contact rolls they remain closed until reset. Otherwise a slight irregularity might not hold the switch closed long enough to operate the signal.

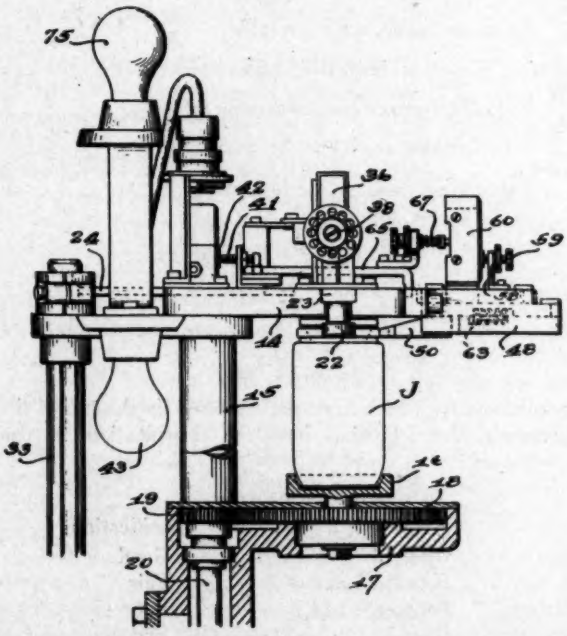


Fig. 4. 2,355,719 : Fedorchak. Automatic container inspection device in which irregularities in the necks are noted by contact rolls which operate micro-switches and light lamps to signal the operator.

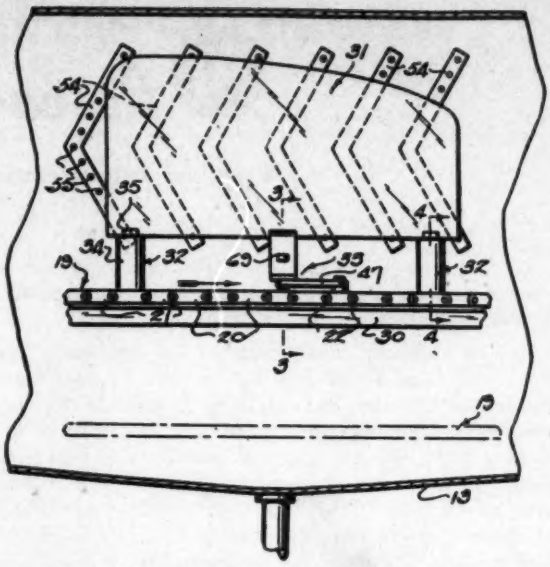


Fig. 5. 2,357,538 : Paddock. Molten low melting alloy is sprayed through jets 55, to apply the initial pressure in the consolidation of laminated safety glass units.

Other Owens-Illinois Glass Co. patents included 2,357,826 to John Hohl of Toledo for a capping machine, and 2,359,252 to Chas. F. Seibert of Alton, Ill., for a transfer mechanism which receives containers from a forming machine and delivers them to conveyers which carry them to lehrs. The latter is particularly intended for use with forming machines which are simultaneously forming ware of more than one shape or size on different heads. The ware is conveyed from the machine until a deflector is met which sidetracks it toward the lehrs. The deflector is a small endless belt in a vertical plane and with the angle of deflection changing in synchronism with the delivery or forming schedule so that each separate size is given a different deflection such as will direct it toward the proper lehr.

Methods of making a laminated lens are described in patent 2,357,345 assigned by Harold R. Moulton of Southbridge, Mass., to the American Optical Co.

Sheet and Plate Glass

In making laminated safety glass the final pressing in an autoclave is frequently preceded by a preliminary pressing between rolls or in some manner which forces out the air. Ormond H. Paddock of Rossford, Ohio (Libbey-Owens-Ford Glass Co.), has found that this initial compression can to advantage be carried out by impinging jets or sprays of a heated fluid such as a low melting point alloy under pressure. Fig. 5 from patent 2,357,538 shows a sandwich assembly 31, moving to the right past sprays 55, which bear upon both sides of the vertically supported sheets. The arrangement of the jets in the shape of a V results in the application of pressure first at the center of the sandwich so that entrapped air may be worked toward the edges. The fluid may be a low melting point alloy of 50% bismuth, 25% lead, 12.5% tin, and 12.5% cadmium. It is preferred that the sprayed alloy be at a temperature of about 150 de-

(*Continued on page* 523)

GI Research Digest

Practical Interpretations of Glass Technology

The Assessment of the Thermal Performance of Tank Furnaces for Melting Glass

In the February, 1944, issue of the *Journal of the Society of Glass Technology* the Society's Furnace Committee recommends and explains a formula for expressing the thermal performance of tank furnaces for melting glass. Assuming certain standards of reference, the formula enables allowances to be made, with reasonable accuracy, for the influence of furnace temperature, of the rate of discharge of glass, of furnace size and of fuel quality. The standards assumed have reference to a furnace with a total glass surface area of 600 sq. ft., operating at a temperature of 1400° C. and, although fully charged, not actually discharging glass. The thermal performance is expressed by the number of B.T.U. consumed per second per sq. ft. of heated glass surface.

The thermal performance formula is:

$$Q = 0.026 \left(\frac{GH}{AK_A K_T} - \frac{Wc}{AK_A} \right)$$

(When fuel consumption and glass load are expressed in terms of American short tons (2,000 lbs.), instead of in British tons, the constant in the formula must be multiplied by 0.893.)

- Q = Quantity of heat required per second to maintain 1 sq. ft. of glass surface at 1400° C. . . . . B.T.U./sq. ft./sec.
- G = Total quality of fuel consumed in the furnace per 24 hours. . . . . Tons/24 hrs.
- H = The net heat content of the fuel. . . . . B.T.U./lb.*
- A = Total area of the glass in the melting and working portions of the furnace exposed to the crown when the furnace is new. . . . . sq. ft.
- W = Weight of glass discharged from the furnace per 24 hrs. . . . . Tons/24 hrs.
- c = Quantity of heat required, at the reversing valve of the furnace system, or at an equivalent position, to melt the raw materials needed to yield 1 lb. of glass and to raise its temperature to 1400° C. . . . . B.T.U./lb.
- K_T = Numerical correction factor to be applied when the furnace, as a whole, is working at some temperature other than 1400° C.
- K_A = Numerical factor to enable correction of furnace area to be made to the standard of 600 sq. ft.

Tables and equations for calculating the furnace temperature, load, cullet content and furnace area corrections are given in the original paper. The effect of glass color and furnace age are not corrected for, but are given as part of the data in the case of actual furnace tests.

As an illustration of the method of using the formula the following example is given; The furnace is producer-gas fired and is operating under the following conditions:

Melting end area $A_1 = 480$ sq. ft. temperature $T_1 = 1490°$ C.
Working end area $A_2 = 160$ sq. ft. temperature $T_2 = 1360°$ C.
Total area $A = 640$ sq. ft.
Glass melted = 42 tons/24 hrs.
Percentage cullet in batch = 40
Coal consumption = 20 tons/24 hrs.
Calorific value of coal = 12,870 B.T.U./lb. net

Now $H = 0.8 \times 12{,}870 = 10{,}300$ B.T.U./lb.

From the furnace temperature correction table

$K_{T1} = 1.12$ for $T_1 = 1490°$ C.

and

$K_{T2} = 0.95$ for $T_2 = 1360°$ C.

from the furnace temperature equation

$$K_T = \frac{A_1 K_T + A_2 K T_2}{A} = \frac{(480 \times 1.12) + (160 \times 0.95)}{640} = 1.08$$

From the cullet correction table

$c = 1640$ B.T.U./lb.

From the furnace area correction table

$AK_A = 625$

Using these values in the formula

$$Q = 0.026 \left(\frac{GH}{AK_A K_T} - \frac{Wc}{AK_A} \right)$$

$$= 0.026 \left(\frac{20}{625} \times \frac{10{,}300}{1.08} - \frac{42 \times 1640}{625} \right)$$

$= 5.07$ B.T.U./sq. ft./sec.

From data which has been obtained by the use of the formula the following basis of classification is also proposed.

Thermal Performance B.T.U./sq. ft./sec.	Classification
Under 5	Good
Between 5 and 6	Fair
Between 6 and 7	Poor
Over 7	Bad

Recommended procedures for duration of test, determination of fuel consumption (coal, liquid or gas),

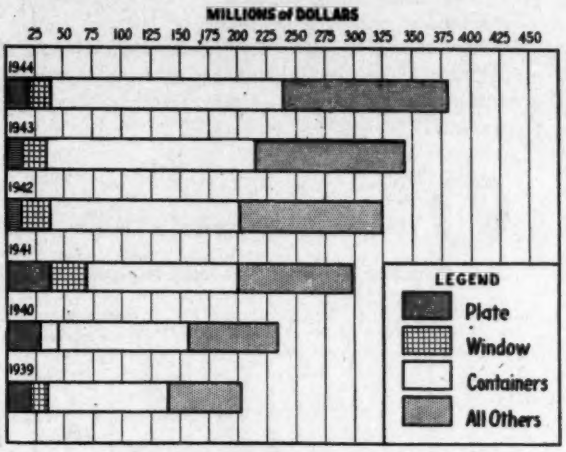
(*Continued on page* 514)

* In the case of producer gas, when the quantity and calorific value are unknown, it is taken as 0.8 of the net value of the coal.

CURRENT STATISTICAL POSITION OF GLASS

GI THE GLASS INDUSTRY'S INDEX

Production Eight Months, January Through August



Activity in the glass industry during August showed an increase over the figures reported in July. As reported by the Production Index, production for August was $48,000,000 as compared with $46,000,000 for July and $47,000,000 for August of 1943. Output for the January-August period of 1944 was $381,000,000, comparing with $348,000,000 for the same period of 1943—an increase of slightly more than 9 per cent.

Plate glass production for September was reported at 9,045,516 sq. ft. by the Hughes Statistical Bureau. This figure shows a decrease of about 7 per cent from that reported for August. However, the 1944 September production is shown at about 23 per cent over that of September of last year. A total of 78,200,911 sq. ft. has been produced during the first nine months of 1944, compared to 52,885,789 sq. ft. reported for the same period of 1943—an increase of 48 per cent.

Glass container production for September was reported at 7,737,445 gross, by the Glass Container Association of America. This is a decrease of 10 per cent from the figure reported in August, and an increase of about 1½ per cent over September, 1943. During the first nine months of 1944 glass container production rose to 75,779,201 gross, as compared to 68,637,856 gross for these same months of the preceding year—an increase of 13 per cent.

Shipments of glass containers during September totalled 7,521,979 gross, a decrease of around 11 per cent from the preceding month and a decrease of slightly over 1 per cent from September of last year. Total shipments reported for the first three quarters of 1944 were 73,303,138 gross—an increase of 4 per cent over these months of 1943.

Inventories on glass containers for September were 5,163,543 gross, slightly more than the figure reported for August and an increase of 5 per cent over September of last year.

Automatic tumbler production for September totalled 6,560,940 dozens, a decrease of 6 per cent from the preceding month, and an increase of 45 per cent over September, 1943. Shipments of automatic tumblers for this month totalled 6,290,460 dozens, a decrease of 4 per cent from August and an increase of about 56 per cent over September, 1943. Finished stocks on hand at the end of September were reported at 7,147,819 dozens.

Table, kitchen and household glassware: Manufacturer's sales of machine-made table, kitchen and household glassware for September were reported at 2,820,381

GLASS CONTAINER PRODUCTION AND INVENTORY

(All Figures Are in Gross)

		Production Sept. 1944	*Stocks Sept.* 1944
Foods; Medical & Health Supplies; Chemical, Household, Industrials; Toiletries & Cosmetics	Narrow Neck	2,674,797	1,862,246
	Wide Mouth	2,409,387	1,723,444
Dairy Products		235,158	323,385
Home Canning		113,893	305,478
Beverages		550,201	297,818
Beers		739,736	252,618
Liquors		728,745	311,036
Wines		235,179	72,897
Packers' Tumblers		50,349	14,621
Total		7,737,445	5,163,543

GLASS CONTAINER SHIPMENTS

(All Figures Are in Gross)

Narrow Neck Containers	*Sept.* 1944
Foods	893,868
Medicinal & Health Supplies	857,265
Chemical, Household, Industrials	534,480
Beverages	497,215
Beers	661,168
Liquors	665,380
Wines	239,076
Toiletries & Cosmetics	426,030
Sub-Total (Narrow Neck)	4,774,482
Wide Mouth Containers	
Foods	1,819,223
Dairy Products	251,075
Home Canning	159,431
Medicinal & Health Supplies	211,063
Chemical, Household, Industrials	107,165
Toiletries & Cosmetics	145,758
Packers' Tumblers	53,782
Sub-Total (Wide Mouth)	2,747,497
Total shipments	7,521,979

Attention . . .

Glass Tank Operators

***For Maximum Life* SPECIFY**

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CAST SUPER REFRACTORY

For

Mantels, Feeder Parts, Tuckstones, Burner Blocks, Port Covers, Port Bottoms, Port Arches, Port Skews, Port Baffles, Lintels, Jambs, Bridgewall Covers, etc.

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dozens, an 11 per cent decrease from August and a 30 per cent increase over this month in the preceding year.

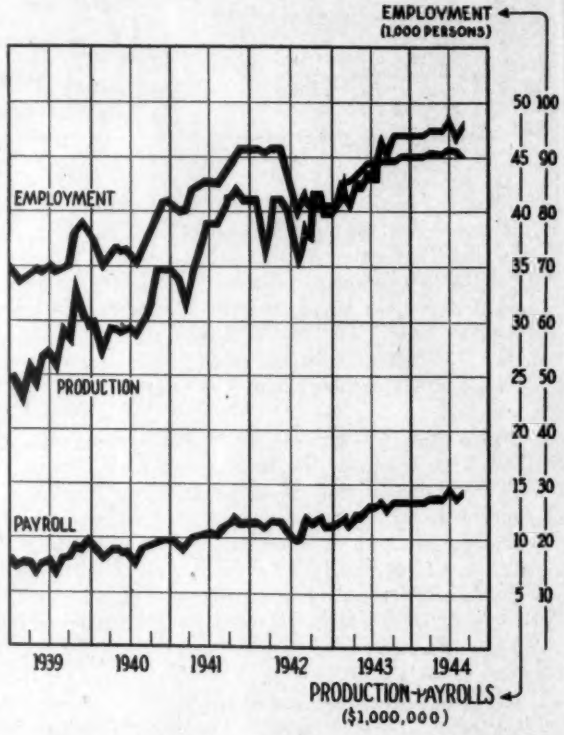
Miscellaneous glass products manufactured in August were estimated at $17,000,000 the same as that reported for July. This is also the same figure as that shown for August, 1943.

Employment and payrolls: The total number of persons employed in the glass industry during August was 90,000. This compares with 91,300 employed in July, and 89,400 employed in August of 1943.

Payrolls for August were estimated at $14,500,000—3 per cent above the July figure. During the first eight months of 1944, glass manufacturers have paid approximately $112,500,000 in salaries.

GJI THE GLASS INDUSTRY'S INDEX

Monthly Trends Through August, 1944



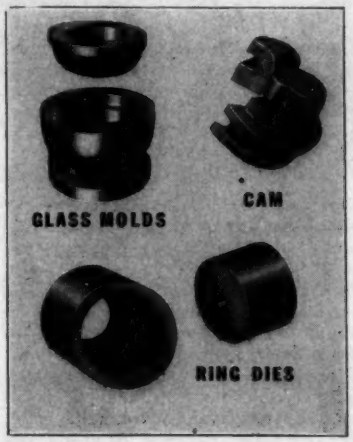
DEATH OF FRANKLIN GLASS CORPORATION EXECUTIVE

George Cope Stewart, aged 74, Treasurer of the Franklin Glass Corporation, died on October 14.

In 1931, Mr. Stewart was instrumental in setting up an operating corporation, the Standard Plate Glass Corporation, to put back into production the plant and facilities of the Standard Plate Glass Company which had gone into bankruptcy due to the depression. After the assets of this company were sold to Franklin Glass he became Treasurer of the new concern and continued this association for the remainder of his life.

NEW EQUIPMENT AND SUPPLIES

CAST-TO-SHAPE TOOL STEELS



Tool steels are now being cast-to-shape for commercial applications by the Cast-to-Shape Division of Jessop Steel Company, Washington, Penna., which has recently been expanded by the addition of up-to-date equipment for the production of special steel castings.

Jessop Tool Steels Cast-to-Shape are used for dies, forming tools, glass molds, gauges, hobs, gears, cams and numerous other items. Of the many advantages that may be obtained by using this process, probably the most pronounced are the savings of time, labor, material, and machining costs. These savings are most noticeable in the case of tool steel dies needed for immediate production, for the die is cast to the shape in which it will be used and requires only a minimum of machine finishing. All castings are furnished in the annealed condition to facilitate machining.

Standard types of tool steel castings are regularly being made, in the latest types of casting equipment, of air hardening, oil hardening, flame hardening, stainless and heat resistant analyses. Many other analyses of specialty steels are available and even the users "tailor-made" specifications may be cast to shape. When large castings are poured, the heaviest sections are cored out, and in addition of reinforcing ribs is used for added strength. This allows a greater strength, with less weight and material.

REVERSE FLOW HEACON DAMPER FOR BY-PASS CONTROL

The new Heacon Damper recently introduced by the Thermix Engineering Company, Greenwich, Conn., employs two curtains for regulating gas flow in either direction.

The curtains are tied together mechanically so as to operate simultaneously. This permits flow in either direction regardless of the damper position.

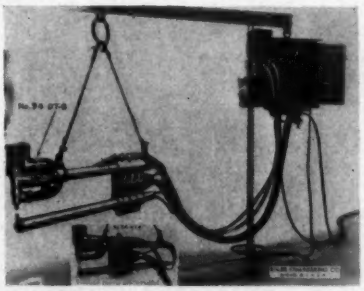
With a damper of this type in a natural draft by-pass around fans, or in a heat or dust regulator equipment, many of the evils normally encountered are eliminated. It provides complete isolation of the equipment for maintenance purposes. Elimination of recirculation gives increased capacity and heat absorption, thereby reducing the maintenance of equipment under control. Banking losses are reduced and accurate regulation of natural draft is obtained.

This damper type DVHR can also be successfully used in cross-over air ducts between forced draft fans.

RAPID WATER ANALYSIS APPARATUS

The Aero-Titrater, a product of Chief Chemical Corporation, New York City, furnishes the plant operator and laboratory technician with a rapid, precise method for the determination of hardness, calcium and magnesium in waters, both industrial and potable. It is also widely applicable to water problems in the process industries.

The instrument is supplied calibrated and ready for assembly and use. There are no moving parts to wear out and no delicate features to go out of adjustment. All vital parts are of durable plastic construction.



PORTABLE AIR OPERATED ADJUSTABLE GUN WELDER

Emphasizing the economical usefulness of extending the field of service of portable resistance welding equipment, considerable work has been accomplished by the Eisler Engineering Co., Newark, N. J., in improving and simplifying the adaptability of portable welders to a wide variety of postwar uses.

Where the volume of production does not justify the purchase of large welding equipment—on places hard to reach with a stationary welding machine—when it is not practical to move the bulky work to the regular production line—this type of easy transportable easy to handle, free swinging welding unit will have a definite place in the production set-ups, saving time and material, and reducing drastically the production costs without sacrificing the normal quality of the work. Only the connection to the air, water, and power line is all that has to be done in employing this welding unit.

The Eisler model of a portable gun welder is shown in the accompanying photo. It is a direct air operated welding machine, equipped with a double acting air cylinder and the necessary operating mechanism, fully or semi-automatic, depending on the choice of control. The power part consists of an air cooled transformer, with an 8 tap switch for heat regulation (7 on and 1 off position), a pneumatic or electronic actuated timer, and a high speed mechanical or electronic contactor for accurately timing the weld in speed or automatic repeat of strokes. The weld cycle can be initiated by a foot switch as illustrated, or push button. The air system includes solenoid operated air valves, air filter, pressure regulator, gauge and switch and an air line oiler. The kickless cables of 500 M.C.M. are sufficiently water cooled in a single circuit.

The unit is self contained. The base, separating and isolating the holding arms is a rugged bronze casting, and the sturdy horns are made from hard drawn copper. Flexible copper braids carry the power current to the movable electrode. The water cooled tapered welding tips are of special high conductive heat and wear resisting alloy, easy to insert, and interchangeable. The welding gun is free swinging, attached to a beam, counter-balanced against the transformer, and can be mounted horizontally or vertically, or if needed, fixed on a low base. These units are manufactured in sizes from 30 to 150 K.V.A.

A distinctive feature of this Eisler model portable gun welder, is the convenient adjustment to different throat depths in a range of 12 in. to 48 in. as shown in insert.

DECAL TRANSFER LOCATES FIRE EQUIPMENT

Many shops and factories, conscientious in providing modern extinguishing equipment, and training personnel in the latest fire-fighting methods, fail to properly mark the *location* of each extinguisher within the property area.

Painting and lettering of fire extinguisher signs on pillars, walls, or compartments, takes time and labor from already over-burdened manufacturers. Realizing this, Randolph Laboratories, Inc., has developed a new extinguisher locater sign; a decal water-transfer that can be instantly placed above all extinguishers in the plant area.

This 10-inch diameter locater, printed in large white letters on a bright red background, is visible for 75 feet in any part of the plant. Transfers should be placed high enough so as not to be obstructed from view by machinery or equipment. Directions for application are printed on the reverse side of the transfer.

POLAROID GLASS INSPECTION POLARISCOPE

The Polarizing Instrument Company, New York City, has just produced a new model of the Polaroid glass inspection polariscope (illustrated above). The polarizing field is of 6 in. diameter. The analyzing eyepiece is located 14 in. from the polarizer. The eyepiece is a rectangle 3¼ in. x 1 in. with a facility of vision far greater than any unit made previously by this company. It can be swung to any position from the vertical to the horizontal.

PRE-CLEANER INCREASES SCOPE OF DUSTKOP USES

A new pre-cleaner unit, to be used in conjunction with Model 600 DUSTKOP Dust Collectors, and having exceptionally large storage space for dust, dirt, shavings, lint, and sawdust from various types of medium duty woodworking, buffing, polishing, and similar operations, is added to its line of industrial dust collectors by Aget-Detroit Company, Ann Arbor, Michigan.

The new unit can be supplied with the DUSTKOP power unit complete, or it can be supplied separately for use with existing Model 600 DUSTKOPS already in use. Thus, the effective capacity of the smallest DUSTKOP Dust Collector can be quickly increased to handle buffing, polishing, and similar operations which require large storage space due to the amount of lint, dust, and dirt thrown off as compared with that obtained from dry grinding operations.

Installation of the new pre-cleaner unit is accomplished in a few minutes by connecting the inlet flange sleeve of the pre-cleaner to the outlet of the dust source. The DUSTKOP is placed on top of the pre-cleaner and the connection between the pre-cleaner and DUSTKOP is completed with the sheet metal pipe, furnished with the unit.

The pre-cleaner consists essentially of a cabinet containing a large, easily removable dust storage bin and cylindrical centrifugal separator and is available with inlet flanges having single or double sleeves to connect with the source of the dust. Double sleeves fit standard 3″ diameter sheet metal pipe or flexible metal hose. The single sleeve 5″ diameter connection is recommended principally where a single source of a large volume of dust, lint, shavings, dirt, etc., is involved.

In operation, virtually all of the sawdust, dirt, shavings, lint, etc., drawn in from the source are separated out of the air stream by the pre-cleaner unit. The pre-cleaned air is then drawn through the multiple-blade fan in the DUSTKOP and returned to working space after passing through a spun glass filter which forms the top of the DUSTKOP dust collector.

The storage bin, which has a capacity in excess of 2 cubic feet, is sealed by a sliding panel which is raised to permit access to the bin for emptying.

CATALOGUES RECEIVED

O. Hommel Company, Pittsburgh, Pa., has just released an interesting two-color booklet telling the story of their participation in the all-out production drive on the home front. An interesting series of war combat photos are presented that dramatically illustrate how the Hommel product has been used in the war effort.

The B. F. Goodrich Company, Akron, Ohio, has issued a general booklet on its industrial rubber products for designers of industrial equipment as well as consumer products.

Included in the booklet are discussions of the company's line of Vibro-Insulators, devices of rubber and metal which reduce vibration, moulded, extruded, lathe cut and sponge rubber products, rubber lined tanks and valves, products made with Koroseal, the company's flexible material created from plasticized polyvinyl chloride, V-belts and cements.

H. K. Porter Company, Inc., Pittsburgh, Pa., has published a catalogue illustrating the combined resources of H. K. Porter Company, Inc., of Pittsburgh, and its divisions, J. P. Devine Manufacturing Co., and Quimby Pump Co., displaying an extensive line of process equipment. This is entitled "Porter, Devine, Quimby—The Complete Line of Better Built Equipment for the Process Industries," and forty different categories of process items, ranging from the smallest agitator to huge process vessels, are listed, with many illustrations, engineering drawings and descriptions of operating principles.

Chain Belt Company, Milwaukee, Wis., has a new folder describing REX Flat Spray Nozzles. These nozzles are made in a variety of sizes and from a variety of materials. The folder, besides illustrating and describing the nozzle uses, gives tabular information concerning their discharge in gallons per minute; their dimensions; a list of materials, sizes and prices.

American Potash & Chemical Corporation, New York, N. Y., has recently published an attractive 30-page two-color booklet describing their Trona plant on Searles Lake, California. The booklet is well illustrated with photographs of the plant, exteriors and interiors, equipment, pictures of the town of Trona, which is the active industrial village of the American Potash & Chemical Corporation, and surrounding country. There is also given a list of the uses for Trona chemicals.

Leeds & Northrup Company, Philadelphia, Pa., has a new catalogue, "Optical Pyrometer," which will be interesting to anyone who needs a portable instrument to measure temperatures of glowing objects.

The potentiometer-type instrument described is at once precise, dependable and convenient. It is compact, lightweight and provides readings directly in degrees. The booklet is well illustrated with photographs showing the instrument in use and also descriptive material.

Wheelco Instruments Co., Chicago, Ill., has issued four new bulletins describing the three new instruments added to its line of industrial controllers.

Bulletin J602-2 describes the company's new Throttltrol as a simplified valve positioning device to be used in conjunction with any control instrument having a high and low contact with a neutral position.

Bulletin J303-2 describes the improved Rheotrol, a device to maintain a desired electric power or heat input or flow of liquids or gases to any process or equipment.

Bulletin J403-2 describes the automatic type and Bulletin J402-2 covers the manual type Inputrols which are described as simplified electrical timing devices.

CATALOGUE & BULLETIN SERVICE

Current catalogues and manufacturers' service bulletins reviewed in this department may be obtained by writing to THE GLASS INDUSTRY.

SUPREME COURT HEARS GLASS CASE . . .

(*Continued from page* 500)

ment between the two companies. Since the Court in Toledo had cancelled all Hartford's agreements, Mr. Wright argued that Corning's participation in the pool was ended, and there was no justification for treating it as though the Corning patents were still in.

Turning to the Court's duty to "dissipate the consequences," Mr. Wright saw no consequences to dissipate except in the field of heat-resistant ware produced with the aid of Hartford machines. The Court had found that Corning was enabled to monopolize heat-resistant ware because of its exclusive license from Hartford. Therefore, if the consequences must be dissipated through compulsory licensing, etc., the patents involved are Hartford's, not Corning's, he argued.

The Government, in its answer (by Mr. Isseks) said this: "Corning claims that Hartford's patents, and not its patents, were used to exclude container manufacturers from Corning's field but this argument ignores the fact that Hartford was limited in its use of its patents by the 1922 agreement. Corning was exactly in the position of an exclusive licensee in the non-container field, and it must be treated just as if it had directly entered into the license agreement with each of the Hartford licensees who were excluded from that field."

Mr. Isseks also referred to the presence of Corning directors on the Hartford board throughout the period of the conspiracy, and cited the record of the case to show instances where other companies had sought to enter the non-container field and had been blocked by these two defendants acting together.

In rebuttal Mr. Wright reminded the Court that the Government has conceded that the adjudication should be corrected to confine monopolization and domination, as far as Corning is concerned, to the one field of heat resistant ware. He said the record shows no consequences attributable to Corning machines which would justify compulsory licensing of Corning's patents.

Hazel-Atlas Asks Return of Impounded Payments

Stephen H. Philbin, attorney for Hazel-Atlas Glass Company, appeared in opposition to the terms of Paragraph 46 of the decree, under which the Court required Hartford and Hazel to continue making payments under their found-illegal contract of 1932, but to the Court rather than to each other. The reason given by the Court was to "insure a sufficient fund for the dissolution of Hartford and the establishment of competing concerns if that ultimately becomes necessary." The Government is not now urging the dissolution of Hartford or the establishment of competing concerns, Mr. Philbin said, so the question arises as to what is to become of the money. The Government has suggested that the Hartford payments are to be returned to Hartford and that the Hazel payments from the date of the impounding to September 1, 1942, should likewise be turned over to Hartford. As to the money paid by Hazel from September 1, 1942 to date, the Government suggests it be paid back to Hazel on the basis applied to the earmarked royalties of the other defendants; i.e., less expenses for services.

Protesting this, Mr. Philbin pointed out that Hazel, under the 1932 contract, was paying only for licenses under Hartford patents, and not for the lease of Hartford machines or for Hartford engineering service, as did the other licensees, while Hartford was paying for licenses under Hazel patents which it could extend to its other licensees. He protested that the Court was asking Hazel to perform its obligation under the contract while Hartford was not to perform its obligation and would keep the money paid in the first period. "Our position here is that either the contract is legal and should be performed, or that, if illegal, no payments should be compelled from Hazel for Hartford patents for the benefit of Hartford; that Hartford should not be benefited at the expense of Hazel," concluded Mr. Philbin.

Lynch Objects to Being Enjoined Indiscriminately

Lynch Corporation, through its attorney, Lehr Fess, objected to being included indiscriminately in all of the paragraphs of the final judgment. Such inclusion he said, is not in accordance with law. As a result of the inclusion, he said, Lynch fears being hauled before the Toledo Court for contempt for acts ordinarily and innocently performed in the promotion of its business. The fear arises from Lynch's experience in the present case, Mr. Lehr explained.

"The bill of complaint alleged that the purpose and effect of a cross-licensing agreement (in 1933, with Hartford) was to require purchasers of Lynch machines to use them with Hartford feeders. Naturally, we thought that was an attempt to charge Hartford with a violation of the Clayton Act, not believing that Lynch could be so charged, inasmuch as Lynch had always sold its machines outright without, so far as any knowledge on our part is concerned, ever having imposed any condition that those machines should not be used with the machines of competitors. The case wound up, however, by finding that Lynch had conspired to violate the Sherman Anti-trust Act, and Lynch was included in practically all the several paragraphs of the decree."

Mr. Fess reviewed the history of the efforts his client made to clean its skirts of any illegality in connection with the 1933 cross-licensing agreement as well as in connection with the purchase of the Miller Machine & Mold Co. He said that Lynch felt it had been successful in these efforts, "but nevertheless the case winds up with Lynch included in the decree on the same basis as all other defendants, and, as I say, it is a serious thing for a small successful corporation, such as this, to have to constantly watch its business activities in connection with determining whether or not it might be in contempt of court."

As an example of the hampering effect he said it would be necessary to secure the approval of the Department of Justice before it could sell a machine on an installment contract.

Justice Reed asked, "Is it fair to say that your point is that there ought not to be a decision against you because the practice began was stopped by you?"

"That is correct," Mr. Fess answered. "As one of the cases said, unless there is a dangerous possibility of the resumption of those practices, there is no basis for an injunction. I think that has subsequently been modified

(*Continued on page* 516)

RESEARCH DIGEST . . .

(*Continued from page* 508)

determination of furnace temperatures and glass discharged are also given.

A Test of the Thermal Performance Formula Based on a Glass-Melting Furnace Fired by Coke-Oven Gas

Moxon, Winks and Dudding (*Journal Society Glass Technology, February*, 1944), have reported on the results obtained by the use of the thermal performance formula. In Part I of the paper the data obtained over a sixty-week period and the Q values which were calculated from the data are given. An examination of the thermal performance curve showed that a straight line fits performance and age. This straight line conforms to the formula:

$$Q = 4.48 + 0.0177t$$

where Q = thermal performance
t = time in weeks.

This value for Q was substituted in the standard formula and the equation then solved for G. The following equation was thereby derived:

$$G = K_T (277.6 + 1.1t + 8.8P)$$

where G = gas consumption in 1000's cu. ft. per 24 hrs.
t = age of furnace in weeks
P = glass discharge per 24 hrs.
K_T = furnace temperature correction factor.

This equation makes it possible to estimate the quantity of gas required to maintain the necessary melting and working conditions at varying loads on the furnace.

In Part II of the paper Dr. Dudding illustrates the use of the quality control chart for Q (the thermal performance). By using the standard deviation of the differences between the observed values of Q and the corresponding values given by the relation connecting Q and the age of the tank, control limits may be set up. Points inside of the limits indicate that the process is in control while points outside of the limits indicate that a change has taken place in the operation of the furnace and/or ancillary plant and/or in the recording apparatus.

WPB LIMITATION ORDER L-28 REVOKED

The War Production Board recently revoked Limitation Order L-28, issued January 24, 1942. This order controlled the production of incandescent, fluorescent and other electric discharge lamps.

Revocation of the order is not expected to result in increased production of lamps, since WPB will allocate tungsten, nickel, molybdenum and copper in approximately the same quantities as previously. The thirty-three manufacturers in the industry are now operating at more than twice the 1940 production rate.

Limitation Order L-28-a, containing specifications for the 1,800 permitted types of incandescent, fluorescent and other electric discharge lamps, remains in effect.

WILLIAM BAUSCH DIES AT AGE OF EIGHTY-FOUR

William Bausch, chairman of the board of the Bausch & Lomb Optical Company, and the last surviving son of John Jacob Bausch, who founded the company with Captain Henry Lomb in 1856, died on October 19.

Mr. Bausch had been associated with the company for sixty-eight years and was active in the firm's research work until the time of his death. He was secretary of the company from 1909 to 1935, when he became vice-president. His work was mostly experimental and resulted in numerous inventions and patents.

His successful production of the first American-made optical glass was announced to the American Medical Association and the American Optical Association in 1916, and later that year he perfected anastigmatic photographic lenses for the company.

BILL INTRODUCED TO SET QUOTA ON IMPORTED GLASS

Congressman Earl Lewis, representative from Eastern Ohio, recently introduced Bill H. R. 5368 which, if passed, would set a quota for articles, made wholly or in large part of glass, imported into the United States.

The bill, which would amend paragraphs 217 to 230 of the dutiable list of the Tariff Act of 1930, as amended, provides "That the number of pieces of glassware imported into the United States in any one year, from each nation from which the same comes, shall be limited to 10 per centum of the annual average number of such pieces produced in the United States during the years 1933 to 1937, inclusive."

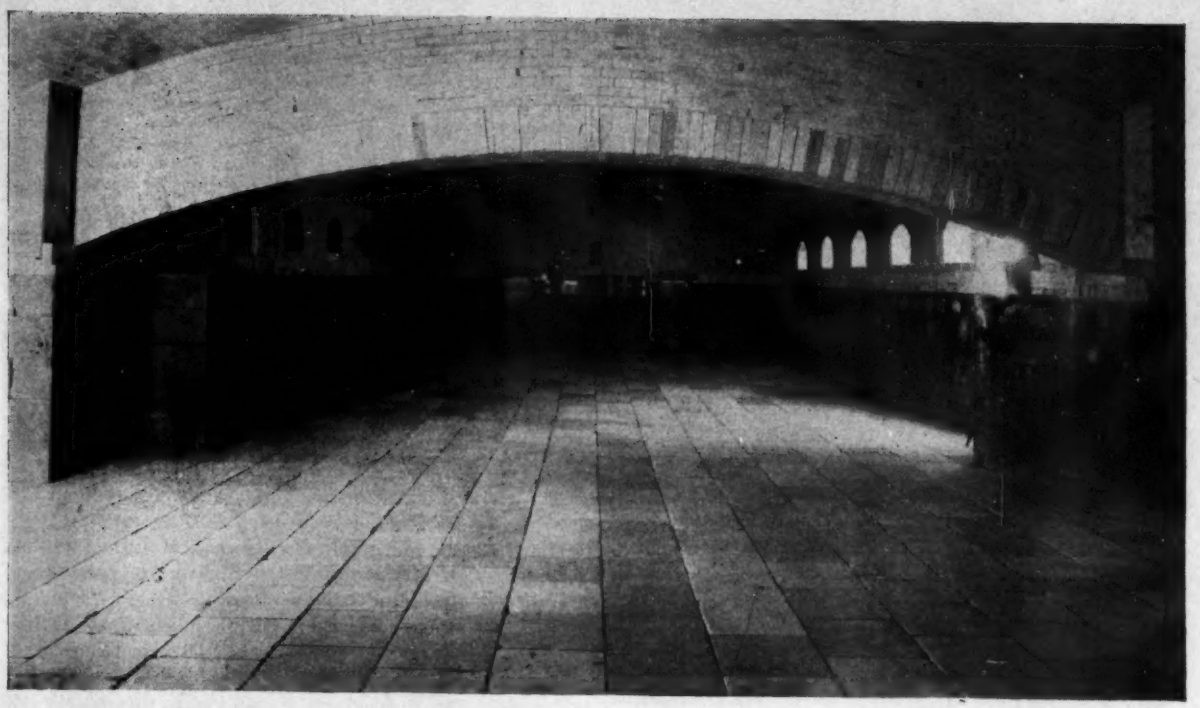
ENGINEERING COMPANIES IN PITTSBURGH MERGE

The Amsler-Morton Company, internationally known engineers in the steel and glass industries, has announced a merger with Pennsylvania Industrial Engineers, Inc. This company will continue operations as a division of Amsler-Morton.

Oscar R. Olson, former President of Pennsylvania Industrial Engineers, Inc., has been elected President of The Amsler-Morton Company, and the announcement named these additional officers: Karl W. Gass, Executive Vice President; Paul M. Offill, Vice President—Sales; Arch V. Ritts, Vice President P.I.E. Division; Theodore H. Sloan, Vice President G.M.S. Division, and T. E. Roop, Vice President—Purchasing.

• Wickwire Spencer Steel Company has announced that its purchasing department, formerly in New York City, is now located in Buffalo, N. Y. In the future all purchases for Wickwire Spencer and its subsidiaries will be handled through Buffalo.

• J. French Robinson, president of the East Ohio Gas Company, Cleveland, was elected president of the American Gas Association at the annual business meeting held in Pittsburgh recently. He assumed the duties of the office immediately.



What About Corhart* Electrocast In The Window Glass Industry?

FOURTEEN years ago we published the photograph above. The furnace shown is a unit of one of the largest manufacturers of window glass in America. Through all the years since the first Corhart installation, this unit as well as all others belonging to this large company have been similarly constructed, with liberal use of Corhart products.

As a matter of fact, of the 32 window glass tanks in the United States, Canada and Mexico, 29 have complete Corhart Electrocast throughout the sidewalls. . . . The 3 remaining tanks are largely Corhart Electrocast but embody small quantities of other materials. . . . Four of the 32 have complete Corhart Electrocast bottoms, and most of them use Corhart Electrocast extensively in the superstructure.

Furnace life and highest quality glass are the reasons for this record of Corhart service to the window glass industry.

We would be happy to send detailed information—particularly to glass companies and engineers in South America and throughout the world.

Corhart Refractories Company, *Incorporated,* 16th and Lee Streets, Louisville 10, Kentucky.

*Not a product, but a registered trade-mark.

QUALITY ECONOMY ENDURANCE

CORHART ELECTROCAST REFRACTORIES

SUPREME COURT HEARS GLASS CASE . . .

(*Continued from page* 513)

to the extent of saying that the Court may take such reasonable measures, and if it reasonably appears that there will be a resumption of the practice, the injunction is proper, but by reason of the cancellation of the contract with respect to Miller wide-mouth machines in 1938, and the cancellation with respect to all machines in 1940, we feel that there is no basis for any injunctive provisions. . . . If the Court should agree with the court below that those acts which Lynch performed were illegal and there was a possibility of resumption of those practices, it is our contention that Paragraph 48 of the judgment is all-adequate to take care of the situation so far as Lynch Corporation is concerned. In other words, it would enjoin it from doing those things." (Paragraph 48 enjoins Lynch from acting under any agreement which would require purchasers of Lynch machines to get licenses from Hartford.)

Ball Brothers Asks Return of $425,000

E. W. McCallister, appearing for Ball Brothers, attacked the ambiguity and breadth of the injunctions, saying that it is difficult to know what may be done under them. All contracts in trade have some restraining effect, he pointed out, saying that Paragraph 41 is so broad that it prevents even the effect of placing a limitation on the production or sale of fruit jars. Defendants will never know what act is safe to perform, he said. Justice Roberts commented that the lower Court had found that agreements were made to limit production, and that those findings had been accepted by the Supreme Court for the purposes of the argument. "Ought not the Court to enjoin those defendants from entering into similar agreements in the future?"

Mr. McCallister replied that the joint brief had argued that any restraint that must be placed on defendants in connection with the limitation of production must not prevent the normal and usual contracts of trade. He gave as an example the granting of an exclusive agency for the sale of Ball fruit jars, which can be construed as having a limiting effect on sales and hence on production.

Pointing out that the Government charged several different conspiracies, Mr. McCallister said that Ball had not been involved in any of the earlier activities complained of and that therefore the decree in its present form goes far beyond what is required to assure relief, even if the charges against Ball and the individual Ball defendants are upheld.

As to the $425,000 which Hartford paid Ball under the August 1, 1940 settlement, which the Court has taken into custody, he said this impounding constituted a forfeiture and therefore is in conflict with equity and with the anti-trust law.

MR. JUSTICE ROBERTS: Let us see if I follow you on this, Mr. McCallister. Hartford, in order to get your company to consent to modification of the license agreements which would take out alleged objectionable features, was compelled to pay your company $425,000 for relinquishment of rights that it bought.

MR. McCALLISTER: Yes.

MR. JUSTICE ROBERTS: And that has been paid?

MR. McCALLISTER: Yes.

MR. JUSTICE ROBERTS: The Court ordered you to pay that back?

MR. McCALLISTER: To pay it to the Court.

MR. JUSTICE ROBERTS: It has been done?

MR. McCALLISTER: It has been done.

MR. JUSTICE ROBERTS: What is the suggestion as to waere this money ought to go? The Court hasn't disposed of it.

MR. McCALLISTER: The Court hasn't disposed of it. The Department's brief indicates that they are not concerned with what the defendant gets. For that reason we contend that impounding cannot—

MR. JUSTICE ROBERTS: (Interposing): They are not concerned with what?

MR. McCALLISTER: That is what they say in their brief. For that reason we contend that it cannot in any sense be considered as relief. I thank you.

Says Court Erred in Not Dismissing Anchor Defendants

Fred Fuller, counsel for the four individual Anchor Hocking defendants, Messrs. I. J. Collins, T. C. Fulton, J. D. Dilworth and W. V. Fisher, called the Court's attention to the Government's admission that the judgment was framed on the theory that one defendant may be enjoined for the sum total of all the acts of all the other defendants, and, as Mr. Fuller said, without regard to his past conduct and "entirely irrespective of whether from his past conduct it is reasonable to anticipate that he may, unless enjoined in the future, engage in similar or related acts, and entirely apart from the question as to whether such a provision is reasonably necessary as to that particular Appellant in order to dissipate the restraints and prevent evasions thereof." Mr. Fuller called it a "basic and fundamental error to make a judgment co-extensive with the power of the court, without regard to the remedial necessities of the case."

As to his clients, he told the Court that there is not a single finding of fact appearing in the record of the case mentioning any of the four by name. Their company was dismissed as one of the corporate defendants, Mr. Fuller said, declaring that the Court below had been in error in not similarly dismissing these individuals.

G.C.A. Asks Modification of Injunctions

The attorney for the Glass Container Association, Mr. Luther Day, directed attention to the lower Court's finding that G.C.A. was a party to the conspiracy in two respects: first, in limiting production by means of its quota or forecast system; and second, by attempting to keep newcomers out of the industry. The Association had no connection with the patent phase of the case, he said, and the Court did not find that it had anything to do with any conspiracy relating to prices. The forecast system was voluntarily abandoned in 1939, according to the record, which also discloses that the last act which can be interpreted as keeping people out of the industry occurred in 1937. This is of present importance in discussing the nature of the relief to be granted against the Association, Mr. Day said.

That relief includes Paragraph 37, which abolishes the statistical committee, but does so in such sweeping terms, according to counsel, that G.C.A. would not be able to continue as a statistical and research body, as the Court had indicated it should. The Association is also enjoined from continuing in office or electing in the future any officers, directors or employees who have been connected with any of the defendant corporations. Mr. Day asked this question:

"The Court below said that it did not believe that

dissolution of the Association was necessary. and that it should continue as a statistical and research body, but how is that possible when it cannot deal in statistics or have any unit which can deal in statistics, one of the principal functions of the Association, and when 74 per cent of the Association (measured upon the basis of production) cannot have in the Association any director or any officer?"

He quoted Chief Justice Stone's decision in the Maple Flooring Case wherein the Court held that persons who unite in gathering and disseminating information in trade journals and statistical reports, on production and market prices, are not engaged in unlawful conspiracies in restraint of trade merely because the ultimate effect of their efforts may be to stabilize prices or to limit production through a better understanding of economic laws or a more general ability to conform to them.

Mr. Day suggested that Paragraph 40 (1) (a) was ample to provide all necessary relief so far as the Association is concerned. This Paragraph is in many respects the heart of the decree, in that it enjoins the Association and the eight corporate defendants from agreeing, combining or conspiring with any other defendant corporation or with any other manufacturer or seller of glassware to limit the production of glassware or machinery used in the manufacture of glassware, or to fix, raise, maintain or adhere to prices of glassware or such machinery, or to coerce, persuade, cause, impel, advise, or induce any manufacturer of glassware or of such machinery to do any of those things. "We think that covers the situation," said Mr. Day, "and frankly we think all the rest should be deleted." This would cut the provisions relating to G.C.A. down to the single general injunction of Paragraph 40 (1) (a), summarized above.

CONTROL MATERIALS PLAN REGULATION AMENDED

The War Production Board amended Control Materials Plan Regulation 5, on September 28th. This regulation controls the procurement of maintenance, repair and operating supplies. A brief review of the order indicates the following ratings for articles most generally made by manufacturers of miscellaneous glassware:

AA-2 Kitchen, household and other miscellaneous articles, as defined in WPB Order L-30

AA-2 Office supplies, including marking devices

AA-2 Ceramic and clay products

AA-2 Lamp bulbs and tubes, except aircraft

AA-2 Lighting fixtures

AA-2 Lighting equipment and accessories other than aircraft, airport and marine

AA-1 Lighting equipment and accessories, aircraft, airport and marine

AA-2 Street and highway traffic control signals and controllers

AA-2 Glass products not elsewhere listed, excluding ornamental and novelty glass

From this list it is obvious that there is no change in the Maintenance, Repair and Operating ratings on glassware in the recently amended regulation.

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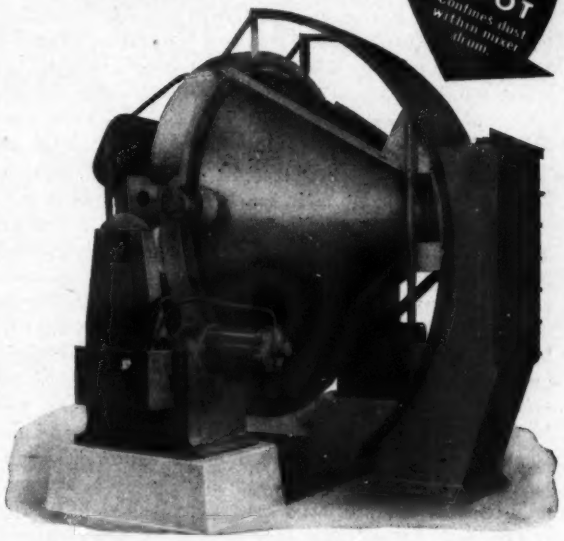

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Left to right: Dr. S. C. Ogburn, Jr., Manager of Research and Development and head of Whitemarsh Research Laboratories; Leonard T. Beale, President of the Pennsylvania Salt Mfg. Co., and C. F. Kettering of General Motors, at dedication.

FORMAL OPENING OF WHITEMARSH RESEARCH LABORATORIES

On October 4th a dedication luncheon was held in the new Research Laboratories of the Pennsylvania Salt Manufacturing Company at Whitemarsh, Pennsylvania. The guest speaker at the luncheon was C. F. Kettering, General Manager, General Motors Corporation, Research Division, and many prominent figures in the world of science, industry, publishing and education attended.

The Whitemarsh Research Laboratories were converted from Whitemarsh Hall, the stately mansion of the late Edward T. Stotesbury. By using an existing structure suitable for conversion, the Pennsylvania Salt Manufacturing Company saved time, building materials, labor and expense in creating an effective group of laboratories to meet the needs of its expanding research and development progress, at present devoted largely to war work. The extensive grounds of Whitemarsh will be maintained, inasmuch as they are famous for their magnificence, being known as the "Versailles of America."

The Pennsylvania Salt Manufacturing Company was founded in 1850, "for the manufacture of lye and the alkaline salts of soda." Today it is an important manufacturer of chemicals used by the glass and ceramic industries, including frits and frosting and etching compounds. It is also one of the country's largest manufacturers of chemicals for agriculture, water and sewage, metal industries, oil refining, pulp and paper, textiles, leathers, laundry and dry cleaning, and aviation gasoline.

Shortly after the close of the Civil War, the Company secured the exclusive American import contract for cryolite from the unique deposits in Greenland. From 1865 until the present, that agreement has been continuously in force and this interesting chemical (sodium fluoaluminate) has been the starting point for a valuable chain of chemical products.

• Clarence M. Brown, Philadelphia attorney, has been recalled as chairman of the Pittsburgh Plate Glass Company to fill the post left vacant by the sudden death of H. S. Wherrett. Leland Hazard, general counsel, was elected vice president; H. B. Higgins, president, was named chairman of the executive committee and H. B. Brown, secretary, was elected to the Board.

OPTICAL SOCIETY MEETING . . .

(*Continued from page* 502)

An Application of Spectrographic Methods to Chemical Concentrations of Trace Elements in Iron and Steel Analysis. *By R. A. Wolfe and R. G. Fowler.*

Spectrographic Analysis of Wrought Copper Alloys. *By P. A. Leichtle and A. F. Wichrowski.*

The Spectrochemical Analysis of Copper Base Alloys. *By E. K. Jaycox.*

UV Ionization of Interrupter Gaps in Spectrographic Spark Sources. *By S. F. Simpson.*

A Non-Mechanical Interrupter for Controlled Spark Circuits. *By R. G. Fowler and R. A. Wolfe.*

General Optics

Preliminary Experiments in Phase Difference Microscopy. *By H. Jupnik.*

Phase Difference Microscopy as a Problem in Diffraction. *By H. Osterberg.*

Coma Free High Aperture Twin Elipsoid Mirror. *By R. A. Woodson.*

Rayleigh Interferometers for Gas Analysis. *By H. M. O'Bryan.*

Electro-Optical Effect in Colloids. *By B. W. Sawmann.*

The $\cos^4$ Law of Illumination. *By M. Reiss.*

A Physical Photometer for Afocal Optical Systems. *By D. B. McRae.*

Schlieren and Shadowgraph Equipment for Air and Flow Analysis. *By N. F. Barnes and S. L. Bellinger.*

TECHNICAL SERGEANT DIMMICK AWARDED THE DFC

The Distinguished Flying Cross was recently awarded to Technical Sergeant Henry M. Dimmick, 22, of Butler, Pennsylvania, for "extraordinary achievement" while participating in many bombing attacks on war plants far behind the German defense lines and military installations ahead of the advancing Allied ground forces.

Prior to entering the AAF in 1942, Sergeant Dimmick attended Penn State College for two years and worked during his summer vacations as an analyst for the Preston Laboratories in Butler. Sergeant Dimmick, who has been flying as radio operator and as waist gunner, also holds the Air Medal with four Oak Leaf Clusters, in addition to the DFC.

GLASS CONFERENCE TO BE HELD AT UNIVERSITY OF ILLINOIS

The eighth of a series of Glass Conferences sponsored by the Department of Ceramic Engineering of the University of Illinois will be held at Urbana, Illinois, on November 16 and 17.

These informal gatherings are designed to appeal to the operating personnel of glass factories and the present meeting will deal with the glass melting process. Speakers from the industry have been obtained who will talk on various phases of the process, starting with the batch mixing operation and extending to the glass ready for working.

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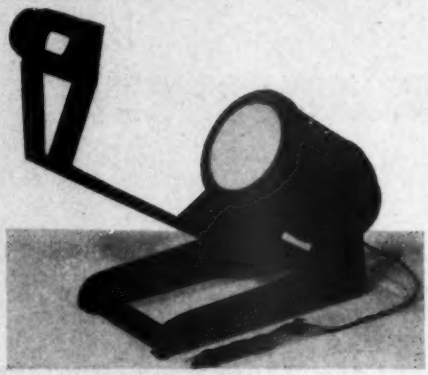

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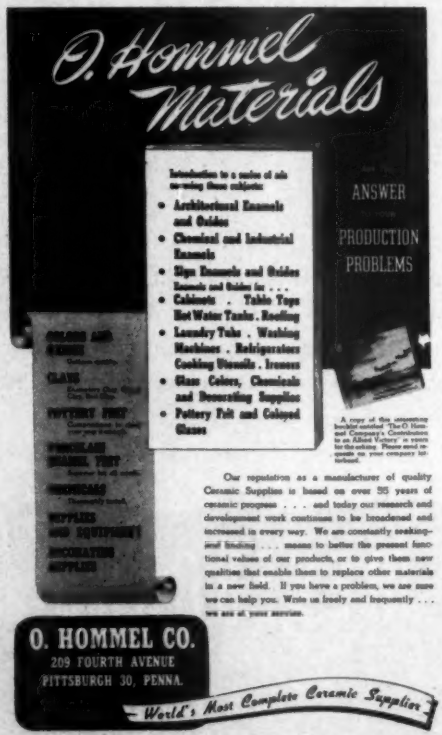
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LOOSE PHRASEOLOGY IN SCIENTIFIC PAPERS WILL NOT DO

September 26, 1944

Editor, THE GLASS INDUSTRY:

Enclosed is a little discussion on pH which you may use in whole or in part, or rewrite as you see fit.

I feel sure that Herman knew better, and knowing editors, I blame the error on editing. Herman probably wrote that the pH increases, and then some zealous editor thought it would be better literary style to reserve the mathematical symbol for use with quantitative data and to use the more elegant English equivalent in the discussion of the results.

I believe you would be doing your readers a big favor by giving some discussions to the question. The pH was invented after a lot of us left school, and the world is complicated enough without letting slovenly English gain a foothold.

Yours truly,
(signed) "A Taxpayer."

Recently, a valuable contribution to glass technology was marred by a slip of the pen. ("Effect of Glass on Alcoholic Products Stored in Bottles at Room Temperature for Three Years," A. Herman and H. L. Shay, Jour. Amer. Ceram. Soc. February, 1944). The article states that, when such products are stored in glass bottles, the hydrogen-ion concentration increases. From the carefully prepared tables and graphs, it is obvious that the authors men that the pH values increase, which is another way of saying tht the hydrogen-ion concentration decreases. In as much as this slip was not caught by the distinguished authors, the publication committee and the editor of a learned journal, nor even your own Research Digest, it might be well for the average glass technologist to refresh his memory on this peculiar symbol.

The easiest way to translate pH into everyday terms is to think of it as the normality of a dilute acid. If the normality of a dilute acid is written in the form $\frac{1}{10^x}$N, then the exponent, x, $\frac{1}{10^1}$N is the pH of the solution. For example, $\frac{1}{10^1}$N is a tenth-normal acid, $\frac{1}{10^2}$N is a hundredth-normal solution, $\frac{1}{10^3}$N is thousandth normal, etc. Since 10^0 equals 1, pH zero means a normal acid, or a concentration of one gram of hydrogen-ion per liter.

Now if you have a hundredth-normal acid (pH = 2) and dilute it with water to ten times its volume, it becomes thousandth normal (pH = 3), if the ionic dissociation of pure water is neglected. Thus, although the hydrogen-ion concentration is only one-tenth as great, the pH value is a larger number.

Of course, if you wish to use decimal values of the pH, it will be necessary to resort to logarithms, and the pH can be thought of as the logarithm of the denominator of the fractional normality, the logarithm of

the reciprocal of the normality, or the logarithm of the normality with the sign changed, or any other convenient definition. But for ordinary mental calculations, where you are willing to drop the decimals and count the zeros on your fingers it is simplest to say "pH 6, that is one over 1 with six zeros or 1-one-millionth normal. That makes one-millionths gram of hydrogen-ion per liter."

CROSS-BOW METHOD FOR DRAWING VITREOUS SILICA FIBERS DEVISED 57 YEARS AGO

August 31, 1944.

Editor, THE GLASS INDUSTRY:

The interesting work of the Westinghouse Research Engineers on the use of a cross-bow for the production of fine vitreous silica fibers which you described in your issue for June, 1944 (page 286) recalls the classical work on this subject. The method was devised by Professor C. V. Boys and described in the "Proceedings of the Physical Society" (London) 1887, 9 pp. 8-19; it is referred to in the American Chemical Society's Monograph No. 37 (p. 828) by Sosman, who states:

> "The method usually used for making vitreous silica fibers is the bow and arrow method originally devised by Boys. By this method silica fibers can be made of any size down to a diameter too small to be seen under a high powered microscope. Such a fiber vanishes into diffraction bands whose motion shows that a fiber is still present, though invisible. Its diameter is less than 0.25 μ, or less than 500 atom-triplets of SiO_2. The smallest one which has been made and handled is estimated at 25 mμ or about 50 atom-triplets."

Boys used the method for the production of fibers for delicate rotational or deflectional apparatus. I am sure the Westinghouse Engineers recognize this work of more than fifty years ago, although your attention may not have been drawn to it.

Yours Faithfully,
W. N. WHEAT,
"Hilary," Worcester Road,
West Hagley,
Worcestershire, England.

BOOK REVIEW

"CHEMICAL ENGINEERING CATALOG"
by Professor E. Raymond Riegel

The Reinhold Publishing Corporation has just issued the twenty-ninth annual edition of the "Chemical Engineering Catalog." This volume is composed of condensed and standardized data on equipment, machinery, laboratory supplies, heavy and fine chemicals, and raw materials used in the industries employing chemical processes of manufacture.

Also included are classified indices of such equipment and materials, carefully cross-referenced, and a technical and scientific book section which catalogs and briefly describes a selected list of books in English on chemical and related subjects.

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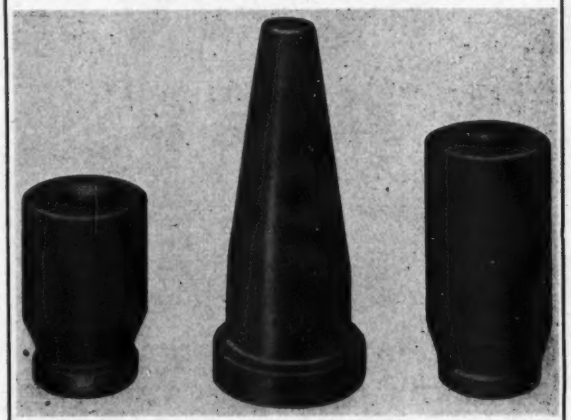

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HIGGINS NAMED PRESIDENT OF PITTSBURGH CORNING CORPORATION

Mr. H. B. Higgins, president of the Pittsburgh Plate Glass Company, has been elected president also of the Pittsburgh Corning Corporation, replacing the late H. S. Wherrett.

R. L. Clause, vice chairman of Pittsburgh Plate, was named vice president of Pittsburgh Corning, which is owned equally by the Corning Glass Company and Pittsburgh Plate. R. B. Tucker, vice president of Pittsburgh Plate, was elected to the subsidiary's board.

Pittsburgh Corning operates a plant at Port Allegany, Pennsylvania, manufacturing specialty glass such as Foamglas for insulation and glass blocks. Virtually all of its products are sold through Pittsburgh Plate Glass.

DIAMOND ALKALI PURCHASES CHEMICAL COMPANY

The Diamond Alkali Company of Pittsburgh has announced its purchase of the Emeryville Chemical Company located in San Francisco. The manufacture of silicate of soda, sodium metasilicate, and silicate compounds will be continued at the plant in Emeryville, California.

Mr. Stanley Pedder and Mr. Charles Eckland will continue in their present capacities as President and Vice President of the Company, and no changes in personnel are contemplated except that Howard R. Bauer will be transferred from the Diamond Alkali organization to San Francisco to serve as General Manager of the Emeryville Chemical Company.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACTS OF CONGRESS OF AUGUST 24, 1912, AND MARCH 3, 1933

THE GLASS INDUSTRY, published monthly at 55 West 42nd Street, New York 18, N. Y., for October 1, 1944, State of New York, County of New York, ss:

Before me, a Notary Public in and for the State and County aforesaid, personally appeared John T. Ogden, who, having been duly sworn according to law, deposes and says that he is the Publisher of THE GLASS INDUSTRY and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: John T. Ogden, publisher, 55 West 42nd Street, New York 18, N. Y. Cyril B. Delgado, editor, 55 West 42nd Street, New York 18, N. Y. Managing editor, none. Cyril B. Delgado, business manager, 55 West 42nd Street, New York 18, N. Y.

2. That the owners are: Ogden Publishing Company, 55 West 42nd Street, New York 18, N. Y. John T. Ogden, 55 West 42nd Street, New York 18, N. Y. Katherine Waller Ogden, 55 West 42nd Street, New York 18, N. Y.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: None.

4. That the two paragraphs next above giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

(Signed)
JOHN T. OGDEN, *Publisher.*

Sworn to and subscribed before me this 22nd day of September, 1944.

Irving A. Honig
Notary Public, Queens County
Queens Co. Clk's No. 932
New York Co. Clk's No. 170
Commission Expires March 30, 1946

1907 was a great year . . .

and 1913 was one of accomplishment

In 1913 the Parcel Post mailing system went into effect throughout the nation—(6,000,000 packages were handled the first week) . . . Thomas A. Edison gave a demonstration of talking-motion pictures . . . Woodrow Wilson was inaugurated as President of the United States.

Banner Lime, in its sixth year, was accomplishing things too, because of its purity and superior quality . . . extending its uses in the field of building construction, in the glass and steel industries, and in agriculture. National Mortar & Supply Company, Grant Building, Pittsburgh, Pa. Established 1907.

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INVENTIONS AND INVENTORS . . .

(*Continued from page* 507)

grees F. After passing through this pressing unit the sandwiches enter another chamber carried at a slightly higher temperature for the purpose of removing all traces of the alloy from the glass and equipment.

Patent 2,357,537 issued to Horace G. Orser and Wm. P. Bamford of Libbey-Owens-Ford Glass Co. tells of improvements in the method of simultaneously bending two sheets of glass preliminary to bonding them together to form safety glass. In this process it has been customary to separate the two sheets with another very thin one having about the thickness of the plastic layer. Then when these three layers are heated until they take the shape of the bending mold, the two principal sheets will have the exact desired curvature needed when the thin inner sheet is removed and replaced by the sheet of plastic. In this process it is necessary to see that the inner sheet is coated with such a material as diatomaceous earth to keep it from adhering to the assemblage. The procedure has been to lay down the first sheet, spray it with the coating, then the separating sheet whose upper surface is next sprayed and finally topping out with the uppermost sheet. At the bending temperature of about 1160 degrees F. for ordinary bends and about 1280 degrees for the most difficult bends it was found that the diatomaceous earth sometimes stuck to the top surface of the lowest sheet. The inventors report that this can be prevented by refraining from coating the two main sheets, and instead applying the coating to both surfaces of the separating sheet which is later discarded.

Patents involving the use of glass in structural work are 2,359,131 to Wm. O. Lytle of Pittsburgh Plate Glass Co. for a reflecting sign, 2,359,163 to J. H. Sherts of the same company for a double glazing unit, and 2,357,525 to Milton Knight of Libbey-Owens-Ford Glass Co. for a composite block in which glass is used as a facing for cementitious material.

Glass Wool and Fiber

Joseph H. Zettel of Plainfield, N. J. (Johns-Manville Corp.), reports in patent 2,358,900 that when mineral wool or glass fibers are formed by blowing, and when at the same time a hydrocarbon binder is sprayed onto the fibers, fires sometimes break out in the settling chamber, feeding on the combustible binder. To prevent this, Zettel atomizes water into the chamber with the fibers for the purpose of cooling, and to secure certain other advantages.

WICKWIRE SUBSIDIARY APPOINTS SALES COORDINATOR

Wickwire Spencer Metallurgical Corporation, subsidiary of the Wickwire Spencer Steel Company, recently announced the appointment of Evelyn S. Carlson as Sales and Production Coordinator at the company's Newark, N. J., plant.

In her new capacity with the Wickwire Spencer Metallurgical Corporation, Miss Carlson will be responsible for the coordination of production and sales of both tungsten and molybdenum wire.

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